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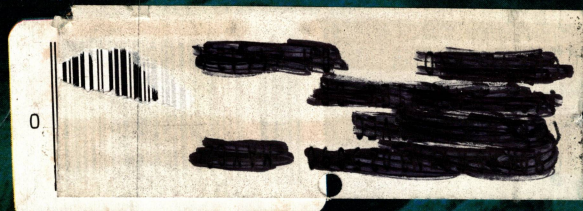
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Volume Thirty Number One

skin diver THE SCUBA MAGAZINE

An Adventure Guide To The US Virgins

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Personal Report: Submerged Treasures

An Industry Report: Dive Computers

With The Best Women Worth A Fine Comb?

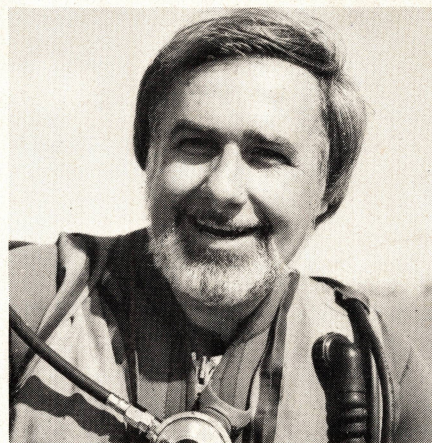
Ikolite Super lite in hand, Becky Laub, Mgr. of Aqua Action, cruises over the wreck of the Cartanser Senior. It lies in 50 feet of water, off Little Buck Island, St. Thomas Harbor. Photo/Geri Murphy.

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SDM Editorial

BY THE PUBLISHER

SELF-RELIANCE — THE KEY TO SURVIVAL



The first commandment of diving is: *Never dive alone*. This rule is taught in every basic scuba class and is intended to be ironclad; an unbendable principle for safe diving. SDM supports this basic concept 100 percent, and believes that buddy diving is absolutely mandatory for every newcomer.

Although SDM has published differing, even opposing, viewpoints on the topic of buddy diving, it should be remembered that these views are expressed by veterans with 20 or 30 years of dive experience. They have been around long enough to make their own judgements. On the other hand, the new diver is in no position to even consider diving without a buddy.

There is much to be said in defense of the buddy system concept. There is no question that this system has saved an incredible number of lives. The numbers range in the tens of thousands, and for all we know, they may exceed over 100,000 during the last three decades. Since no one has compiled any sort of figures on buddy diving rescues, we simply have no way of knowing how many lives have been saved.

Unfortunately, there is a dark side to the buddy system concept. The very same system which has saved so many lives has also contributed to a number of deaths. These occur when the buddy system rule is wrongly applied. Far too many divers become totally buddy dependent. They defer all of the responsibility and planning for the dive to a buddy. They don't even bother to monitor the dive but, instead, obediently follow their partner's moves without fully understanding what is happening. In other words, these divers just go along for the ride — not knowing precisely how deep they have dived, how long they have been down, or even in which direction the boat or shore lies.

This sort of follow-the-leader mentality results in a dangerous dependency upon the buddy system. Such divers are no longer in control of their own destiny and are actually diving blindly. They find it difficult or impossible to make a decision on their own and should they become sepa-

rated from their buddy, they may have a problem surviving. Worst of all, buddy dependency is most habit forming — just like drugs. The more you do it, the easier it becomes and the more you want to do it. Becoming a *buddy-junkie* is courting disaster because the time may come when that buddy just isn't there.

Not convinced? Then consider the following scenario of a classic case of *buddy dependency*. Two divers prepare to make a Caribbean wall dive with a maximum bottom time for the no-decompression limit. The leader is an experienced diver of five years, with two previous trips to the same island location. He almost oozes confidence. His partner is a three year diver, making his first dive at this island location. Both are considered experienced, careful divers with good training records and over 100 open-water dives logged.

The leader plans his dive profile carefully, envisioning the route he will take and the approximate times for descent, wall exploration, and a gradual diagonal ascent that should bring them right under the dive boat. However, he shares little details of his plan with his partner, and the buddy asks no questions. Bent on impressing his companion, the leader confidently boasts, "Stick close to me, kid, and I'll show you a really great dive." Blind confidence and willing obedience have already begun to spin their web of treachery.

The two divers descend the face of the wall together with less than five feet between them. The leader is doing everything precisely by the book — setting his watch bezel at the surface, consulting his depth gauge as they level off at 110 feet, and making mental notes of their direction and distance from the boat. After ten minutes of leisurely exploration along the face of the wall, the two divers ascend to a slightly lesser depth and continue cruising.

At this point, the leader comes upon the opening of a coral tunnel in the face of the wall. It surprises him momentarily — he had forgotten about this part of the reef. Now he is reminded of what a thrill it is to swim through the winding tunnel, as-

cend its vertical chimney and exit on the very top of the wall. It should be a fitting climax for what has been a beautiful dive. He beckons his buddy to follow him through the coral passageway, and quickly disappears into the reef.

His buddy has second thoughts. He has never been through a coral tunnel before and really doesn't like the feel of it. He hesitates at the tunnel entrance, trying to muster up the courage to enter. He peers into the narrow crevice and now finds the passageway is a swirling cloud of fine silt and sand, stirred by the leader's fins and exhaust bubbles. No way is he going into that muck! He'll wait this one out.

It does not occur to the buddy that the tunnel may have another exit. After what seems like an eternity (only three minutes) the buddy begins to suspect the opening is not a cave but instead a tunnel. Some of the silt has settled and he can now see that the passage leads off to the left. Anxious to catch up with his friend, the deserted buddy goes into the tunnel hoping to intercept his partner as he emerges from the passageway. What he doesn't realize is that the tunnel doubles back in the opposite direction. The dive buddy is actually swimming away from his partner.

After five minutes of searching, the buddy diver is frantic. He has not only failed to find his partner but is now hopelessly lost. He is afraid to surface because he may need decompression. He knows he was deep, but never bothered to check his own depth gauge. He has no idea of his total bottom time since he never set his bezel or timed the start of the dive, and now lost on an unfamiliar drop-off, this helpless diver isn't even sure where the boat is anchored.

With his heart pumping like a steam engine, the lost buddy races back and forth along the top of the wall desperately trying to find his partner or some recognizable reference. Then the inevitable happens — the distraught diver runs out of air! In his confusion, he had neglected to check his submersible pressure gauge and had not even noticed that it was getting progressively harder to breathe from

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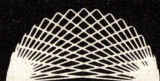


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EDITORIAL

his regulator. The next moment, the device simply stops giving air.

The transition is abrupt and fatal. In a short span of ten seconds, the buddy diver goes from a mental state of apprehension, to a critical phase of *full panic*. He is now a mindless maniac, thrashing and clawing his way to the surface 40 feet above. The embolism occurs just ten feet from sunlight, fresh air and safety.

Ironically, accident investigators record the cause of this tragedy as, "separation from buddy diver." Friends and dive associates are led to believe this accident victim violated the cardinal rule of diving and are puzzled as to why he would take such a risk. The truth of the matter is that the diver was actually a victim of the buddy system rule which was supposed to protect and preserve his life.

Scuba accident statistics reveal an appalling number of buddy related fatalities. There is case after case where dive buddies become separated underwater and the results are simple and seemingly stupid accidents. In far too many cases, dive buddies go into the water with only one depth gauge, one dive watch, or one pressure gauge between them.

There is evidence that far too many divers do not know how to figure their bottom time accurately, to use the repetitive dive tables correctly, or even how to make an emergency out-of-air ascent on their own. Follow-the-leader mentality has turned these people into pathetically helpless sheep who cannot find their own way back to safety.

There is even a more ominous pattern of multiple diver deaths in which both the buddy in trouble and the rescuer end up on the bottom. There have been too many double deaths to ignore this problem any longer.

The time has come for scuba divers to modify their approach to the buddy system. Yes, *you should dive with a buddy, but you should dive as though you were completely on your own.*

Every diver must plan for and monitor his/her own dive, thus preparing for the possibility of buddy separation. Every diver should anticipate imaginary calamities and be prepared to deal with them on an individual basis. Throughout the dive, he/she should ask: "If my regulator stops working right now, what shall I do? If my buddy disappears, what shall I do?" This sort of mental preparation helps to develop personal confidence and an inner calm in times of emergency. It's time that buddy-junkies learn to kick their habit and choose a safer course of self-reliance. 

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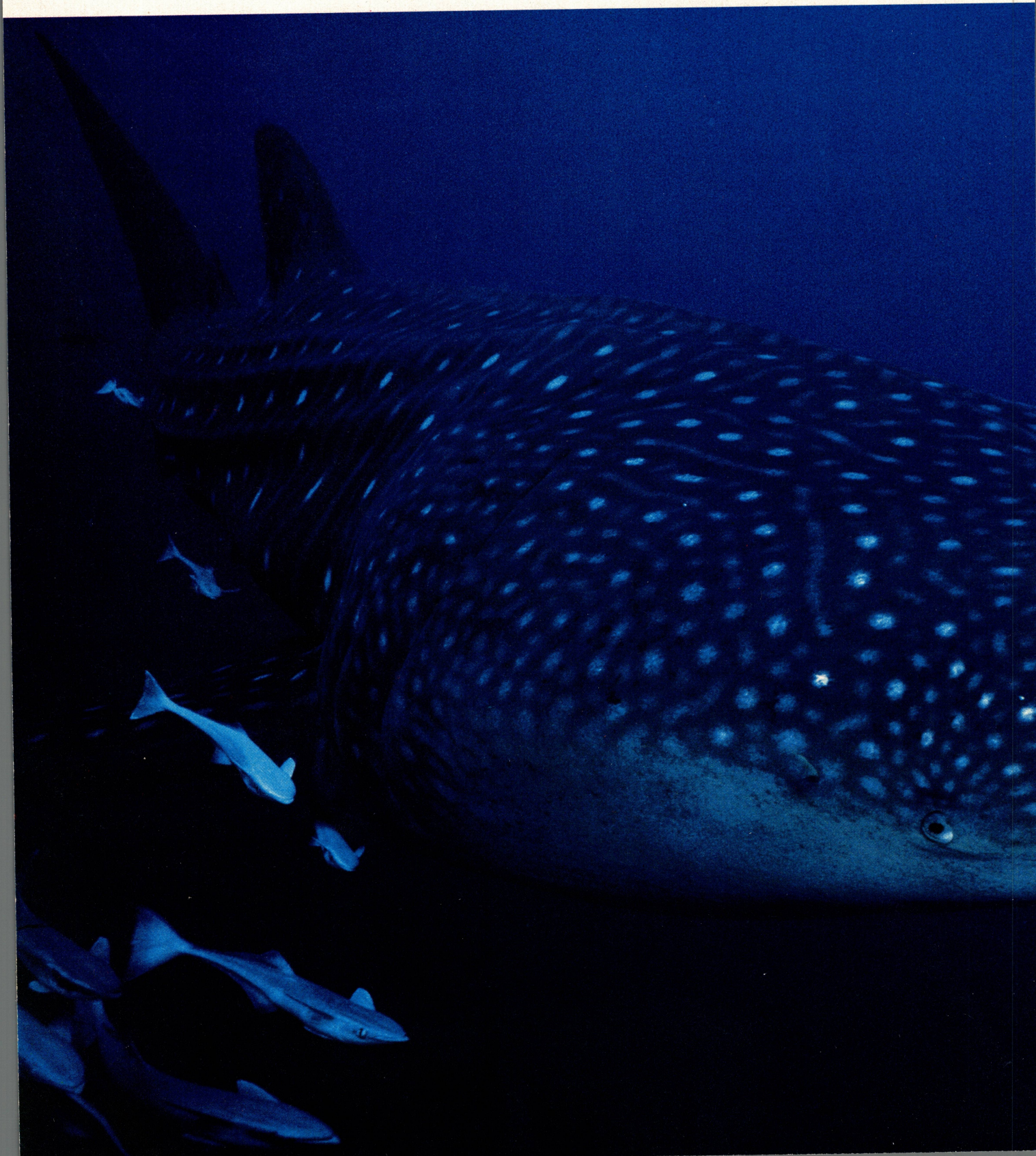
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Ever since my first exposure to the whale shark through the pages of Hans Hass' book, *We Come From the Sea*, I've wanted to see and photograph one of these behemoths myself. Hass was the first man to do it when he filmed

one in 1950 in the Red Sea. On September 25, 1979, I became one of a handful of people not only to photograph one, but to actually get on its back and go for a ride.

Despite its name, the whale shark is not a whale. It is a true shark, a fish. It is

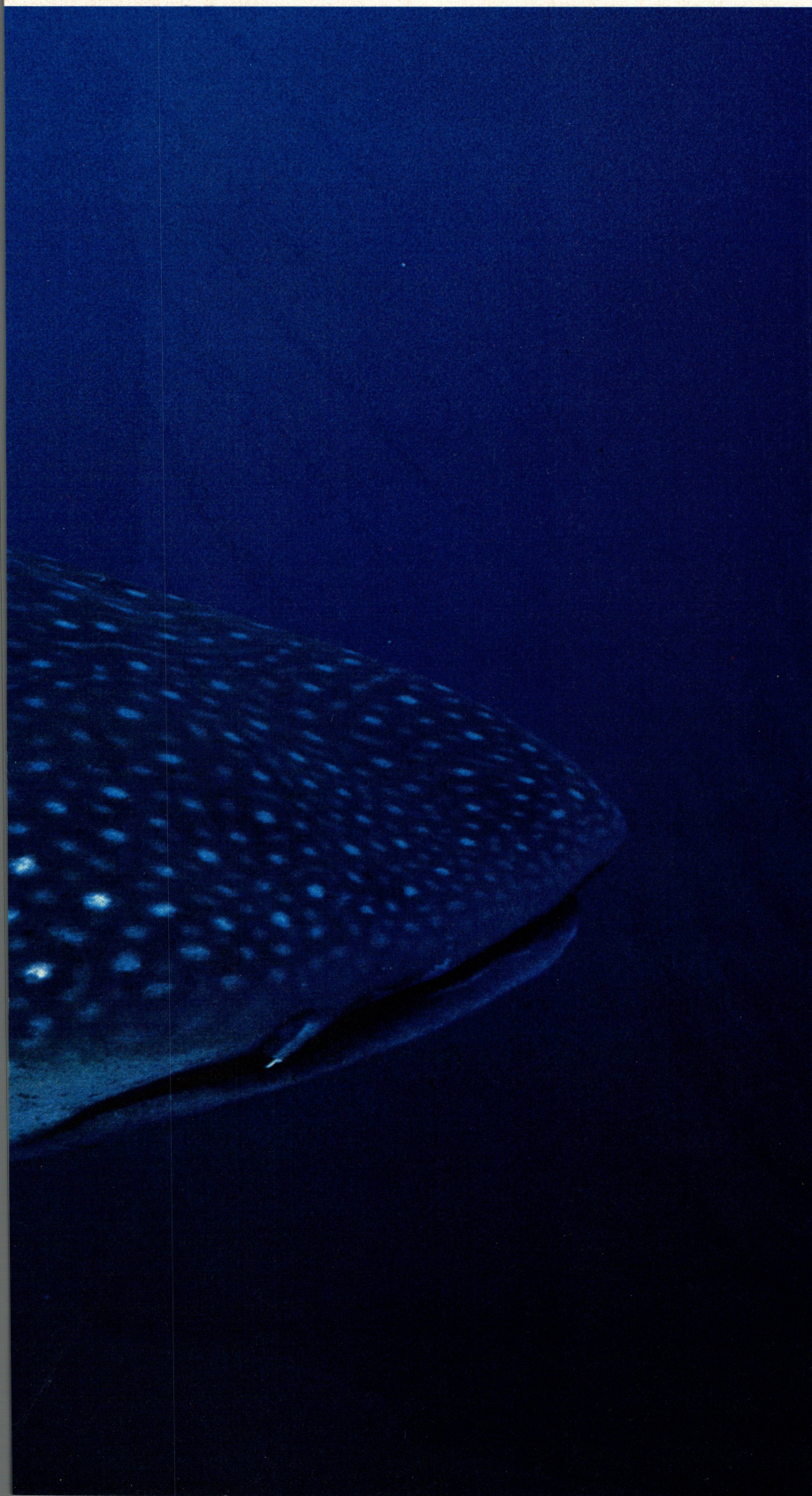
mature when it is 35 to 40 feet long, larger than some species of whales. *Rhincodon typus* has five gill slits, breathes water and lays eggs. It has 3,000 to 5,000 tiny teeth approximately three millimeters long. Gill rakers and strainers extend into the throat. These strain plankton and other minute marine life which flow into the five to six foot wide mouth as the fish cruises through the water. The whale shark's color ranges from gray to brown and is distinctively marked with large white dots separated by white vertical stripes. Unlike other sharks, its mouth is located at the end of its head rather than underneath.

While anchored at the beautiful Ras Muhammed reefs on the tip of the Sinai Peninsula in the Red Sea, my wife and I planned a dive to about 140 feet along the outside eastern edge of the northernmost reef. Sari was carrying a Nikonos camera with a 15mm lens and a strobe, and I had a Nikon with a 55mm lens and strobe. Our plan was to settle down on the sheer reef face to photograph sharks as they came in to investigate us. On each dive here most of the people in our group had witnessed at least three or four black tip sharks patrolling the area.

Leveling off at 130 feet, we passed one photographer already on the wall shooting pictures. Then, I spotted two other divers swimming in from the blue. Slightly irritated, I thought that the more divers here, the less chance of getting our shark pictures. But, we swam on down to about 150 feet and settled against the wall.

We had only been there for a few minutes, when I saw Sari's eyes suddenly light up as she pointed behind me. Expecting to see a reef shark quite close, I turned around. Coming out of the blue, 75 to 100 feet away, was a whale shark. "This is the moment," I thought. "For 20 years I've waited for this." I thrust my camera at Sari, instinctively grabbed the Nikonos with the 15mm lens and swam out to meet the animal. I was intrigued with what I saw and couldn't quite believe it. I estimated the animal to be about 25 feet long. As I approached, it did not change course or speed up. When I reached the huge animal, I grabbed its dorsal fin and let it pull me along. I was amazed at how smooth and gentle the ride was, and yet at the same time quite aware of how powerful this colossal animal could be. Then, I pulled myself over and sat down just ahead of its dorsal fin, straddling its wide body with my legs. Alongside, large remoras (about two and one-half feet long) effortlessly kept up. Without really thinking about taking pictures, I do remember looking through the viewfinder and noting that the whale shark's head almost filled the entire frame. At that depth, its body seemed deep blue with mottled white spots all over. The hide felt as smooth as velour

Text and Photography by Jack McKenney



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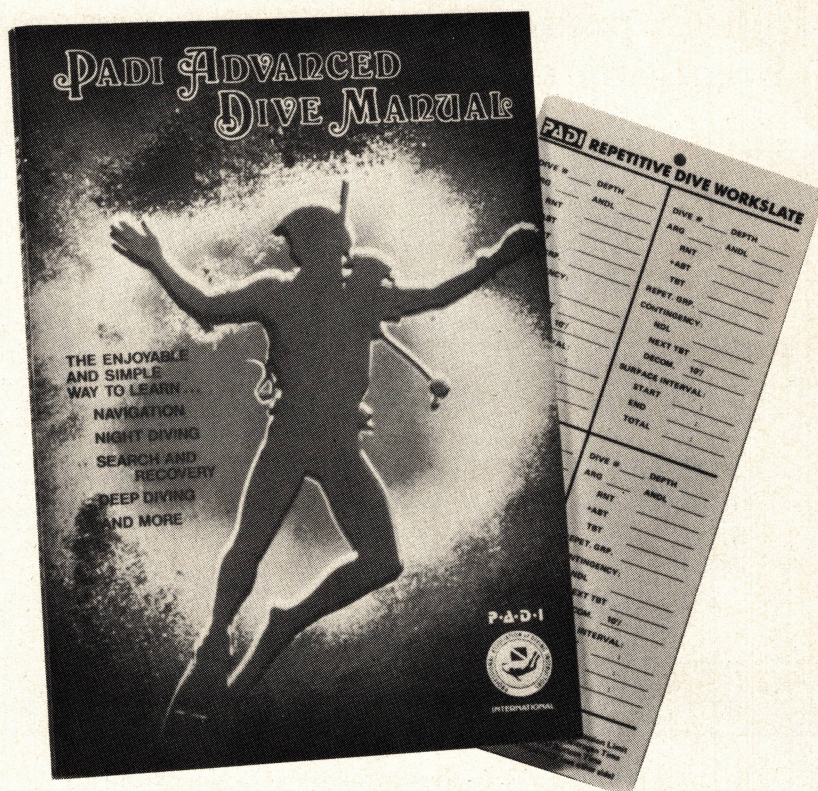
As I had been riding for two or three minutes, the huge animal veered slightly downward. I could feel it becoming agitated — it shook ever so gently. I checked my depth gauge and saw that we had descended to about 160 feet. I slipped up off my perch and once more grabbed the dorsal fin. When I finally let go, I let my hand run over the smooth flesh toward the back of the animal — expecting a horrendous thump from its huge tail; but none came. Instead, there was a gentle pushing motion as the broad tail swept past my body. I kept my eyes focused on this beautiful beast as it descended deep into the blue, accompanied by the stark white remoras. When it completely disappeared, the reality of what I had just experienced struck home.

I glanced around and found myself all alone. Moments before, Sari, unable to keep up with the powerful animal, had headed back to the wall. I swam over to where Sari was waiting, and, after a few minutes of decompression, we began our swim to the boat. I glanced at my camera and was amazed to find that I had exposed 28 frames. I thought I had only shot about six, but the pictures were instinctive and only secondary to the experience of the ride. Now, I only wanted to get out of the water because I had experienced the ultimate. What could possibly happen during our remaining time underwater which could be better than riding a 25 foot whale shark? 🐟

NEW McKENNEY FILM

The Bahamas: Of Dreamers & Divers is a 30 minute, 16mm color/sound film produced for the Bahamas Ministry of Tourism. The basic theme is high adventure — adventures that any vacationing diver may take part in. The film opens with stunning aerials of the Exuma Chain. The camera sweeps down and submerges into a shallow coral reef; highlighting the complex coral reef community and sights that can be seen by snorkelers.

From there viewers visit briefly in Nassau, the cosmopolitan capital of the Bahamas. Then it's off to the family of out islands — Andros, Crooked Island, Eleuthera, Chub Cay, Abaco, Long Island and San Salvador — for some exciting diving. Superb drop-offs, grouper feeding, and a very exciting moray eel sequence lead the audience into night diving, running the Current Cut and diving at a blowhole on North Eleuthera. The Lucayan Caverns in Freeport provide some of the finest cave diving footage ever shot. The exciting shark action (taken off of Stella Maris) is the highlight of the film. A beautiful dolphin, Sandy, closes the film, and a last minute look at the topside beauty of the Bahamas concludes this half hour presentation, by cinematographer Jack McKenney. 🐟



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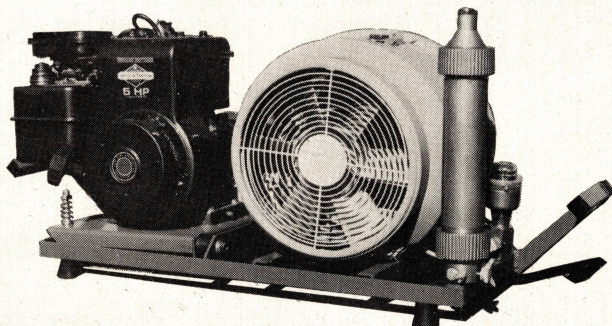
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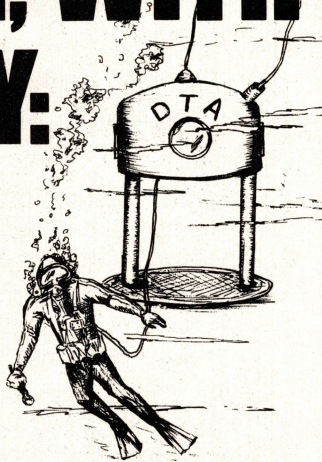
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Diver's Calendar

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January 1 16th Annual Seonn Frozen Fins Dive, Green Harbor Beach, New London, CT (Contact: Pat Fuery, 118 Hunters Ave., Taftville, CT 06380)

January 17-20 1981 DEMA Trade Show, Las Vegas Hilton, Las Vegas, Nevada (Contact: Bob Gray, DEMA, P.O. Box 217, Tustin, CA 92680)

February 21 Sea State '81, Portland State University, Lincoln Hall, Portland, OR (Contact: Sea State '81, P.O. Box 774, Tualatin, OR 97062)

February 26 Underwater Photography-Canadian Style, Hart House Underwater Club, University of Toronto, Ontario, Canada (Contact: Glen Cauterman, NAUI 2032, 1294 Islington Ave., Apt. 304, Islington, Canada M9A 3K2)

February 27-March 1 13th FSDA Film Festival, International Inn, Tampa, Florida (Contact: FSDA Underwater Film Festival, Publicity Dept., C/O Debra M. Wright, 1704 Evans Drive, Clearwater, FL 33515)

February 28-March 1 7th Irish Open Festival of Underwater Photography, Limerick, Ireland (Contact: P. F. McCoole, Festival Director, Maricopa, Revington Park, Limerick, Ireland)

March 10 Underwater Archaeology in Canada, Hart House Underwater Club, University of Toronto, Ontario, Canada (Contact: Glen Cauterman, NAUI 2032, 1294 Islington Ave., Apt. 304, Islington, Canada M9A 3K2)

March 25 Nitrogen Narcosis and Anxiety, Hart House Underwater Club, University of Toronto, Ontario, Canada (Contact: Glen Cauterman, NAUI 2032, 1294 Islington Ave., Apt. 304, Islington, Canada M9A 3K2)

March 27-29 Man in the Sea Symposium, Seattle Center North Court Rooms, Seattle, WA (Contact: Man in the Sea Symposium, P.O. Box 4505, Federal Way, WA 98003)

March 27-29 Underwater Canada '81, Skyline Hotel, Toronto, Ontario, Canada (Contact: Ontario Underwater Council, 160 Vanderhoof Avenue, Toronto, Canada M4G 4B8)

April 4 Underwater '81 NAUI Underwater Symposium, Harvard University, Science Center, Boston, MA (Contact: John Burrage, 29 Hull St., Beverly, MA 01915)

April 4 Underwater '81 NAUI Underwater Film Review, John Hancock Hall, Berkeley St., Boston, MA (Contact: Fred Calhoun, P.O. Box 291, Back Bay Annex, Boston, MA 02117)

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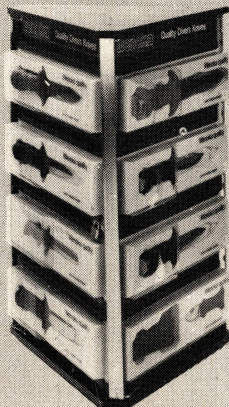
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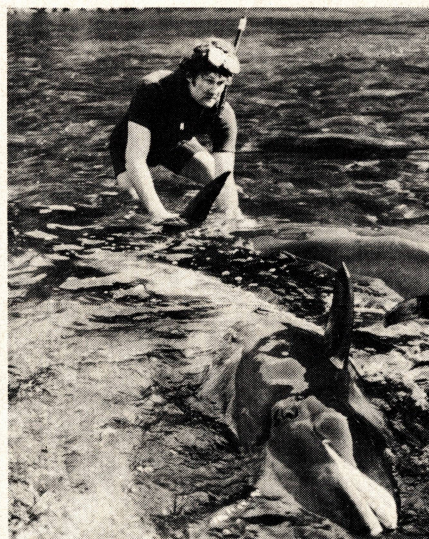


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THE LIVING OCEAN SOCIETY

Environmental film producer, Hardy Jones, announced the creation of the Living Ocean Society, a tax exempt, non-profit charitable organization dedicated to creating new awareness about whales, dolphins and other sea mammals. Jones is the producer of such films as *Dolphin* and *Island at the Edge*, both



CINE Golden Eagle winners. *Island*, winner of best environmental film at the San Francisco International Film Festival, is the story of the massacre of dolphins at Iki, Japan.



The Living Ocean Society is working to end the massacres of dolphins and asks donations for this work. A \$15 membership entitles contributors to a year's subscription to the newsletter covering whale/dolphin issues around the world.

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IMPERIAL

Decompression Stop

5 Minute Discussion At 10 Feet

More Buddy Diving

With reference to the article Buddy Diving: Only for the Lonely . . . , may I say that I fully support the opinion expressed by Mr. Anderson, and I am glad to see that someone has at last brought the issue out into the open. Thank you for a lively and interesting magazine.

D. PHILIP JONES
NORTH WALES

I was appalled to see Dick Anderson's reckless attitude toward buddy diving printed in your magazine. Diving in pairs is a commandment, and never an individual predilection, for the responsible sport diver.

It seems there will always be foolhardy divers — and it takes but a few to tarnish the image of this marvelous, safe aquatic sport. Although Mr. Anderson may be an expert diver and though he certainly can choose whether to drown himself, his degree of experience is not an acceptable reason for publicizing such unorthodox views.

ANDREW VOGEL
CLAREMONT, CA

In regard to all the recent controversy on buddy diving, I'd like to make the following comments. How can all you so-called "experienced" divers out there cut down the buddy system? For you, all I have to say is, "good luck," if you find yourself at even 60 feet and your regulator malfunctions or your pressure gauge breaks and all of a sudden there's no air in your tank (and no one to turn to for help!). And to the guy who got caught under the ice, buddies should *always* check each other's equipment before entering the water. . . . Buddy diving has been around for a long time. Why? Because it works. One dive or 100 under your belt, anyone who dives alone is crazy!

LIZ CARTER
FLUSHING, NY

In relation to the recent articles concerning buddy diving I would like to make the following observations. As diving officer for the Coast Guard's Dive Team I have seen many diverse diving situations. Our team is involved in salvage work, search and rescue, helicopter recovery, aids to navigation work, ship husbandry and pollution prevention. We have established an excellent safety record, however, we have lost one diver.

This diver was lost in 1974, while the dive program was in its infancy and the buddy system was not used. The greatest safety factor that we as divers have is the buddy system.

Most divers, however, fight the system instead of making it work for them. Several perfect examples come from your Decompression Stop letters. Frank Farmer states that "communication underwater is almost totally non-existent." He is mistaken. Whatever happened to hand signals, sign language, line pull signals and slates? Obviously, this takes a little cooperation and effort on your and your buddy's part, but not an undue amount. He further states that, "within 30 seconds after reaching the bottom most dive teams become separated." I have been diving for over ten years — under all conditions, from Alaska to the Gulf — and the only times I have become separated from my buddy was when I did not take the time to agree upon a proper and adequate dive plan prior to entering the water. Proper dive planning (which means talking and communicating with your partner prior to entering the water) will eliminate 99 percent of subsurface problems.

Frank Farmer's contention that "Self Reliance" is the solution to the problem of how to dive safely is naive. Will self reliance aid you when a piece of wreckage breaks loose . . . hitting you in the face, causing you to lose your mask and become temporarily incapacitated? . . . Will self reliance help you when you lose your weightbelt at 120 feet and you had planned on a ten foot stop, but now find yourself on an unplanned buoyant ascent? I could go on.

"Name Withheld" mentions his experience with a buddy who commenced his dive with only 600 psig and promptly ran out of air at 40 feet. Mr. Withheld blames the buddy system for the events that followed. If he and his partner had gone through a proper pre-dive check of each other, including gauging their tanks, the low air cylinder would have been found and corrected.

The Coast Guard Dive Team operates in adverse and hazardous environments. We dive under conditions of fast and/or surging currents, zero visibility, high seas and polluted waters. Our greatest safety tool is the buddy system. We make it work by having each buddy team check one another, talk to each other, plan the dive, stay close and work with

each other. The macho image of, "I'm a tough guy and I can hack it alone" has no place in diving. The Coast Guard spends too much time and money rescuing individuals who foolishly thought they were tougher than Mother Nature.

MICHAEL W. CARR
ELIZABETH CITY, NC

SDM has received mail equally divided between congratulations and condemnation for Dick Anderson.

EDITOR

Shark Tagging and BC Use

Your timely editorial on the evolution and benefits of modern buoyancy compensators was well put. I find it somewhat hypocritical, however, for you to editorialize about the virtues of BC's, and, 12 pages later . . . see an international shark tagging contest in which none of the contestants are wearing even so much as an antiquated CO2 vest.

It's a little difficult to take your comments seriously when your magazine runs photo spreads of "old time divers" suspended over 2000 feet of open water with no buoyancy control whatsoever. Your editorial states that old time divers tend to forget NAUI's motto of "Safety Through Education." I can think of no greater educational vehicles for divers and non-divers than glorified photo articles in SKIN DIVER or TV sport spectacles. If one picture says a thousand words, then televised specials must lock in concrete that diving without a BC is just fine . . .

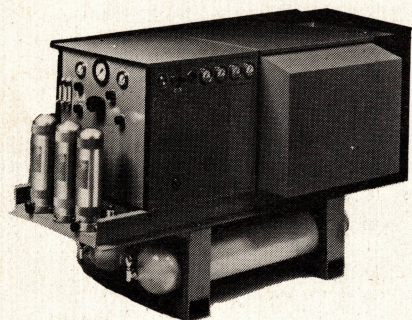
NICK CRAIG
HONOLULU, HI

SDM received several letters pointing out that the editorial on the importance of BC's ran in the same issue as the shark tagging article showing divers without BC's. SDM does not advocate diving without BC's, however, a shark tagging contest is a highly specialized event. The



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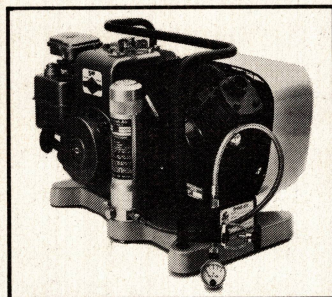


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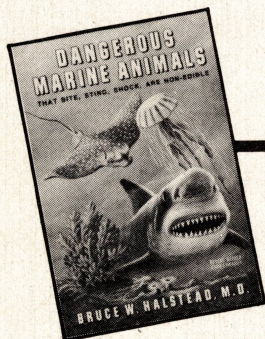
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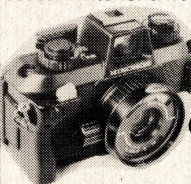
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DECOMPRESSION STOP

shark taggers did not wear BC's because it was important that their field of vision be unrestricted at all times and because speed was very important. We would like to point out that: 1) Each of the shark taggers was accompanied by three safety divers. 2) Only one team (two divers) was in the water tagging at any given time and then for only 10 minutes. 3) Each team had the undivided attention of the cameramen, judge and various support personnel as well as its safety divers. In this particular instance, the disadvantages of wearing a BC far outweighed the advantages.

EDITOR

Plaudits

Congratulations on your October issue! Howard Hall's article and photos were great, as was Carl Roessler's shark photo. I also enjoyed Geri Murphy's article on shark tagging. It had just the right tone of irreverence needed to put the event in its proper perspective.

In the past few months, SKIN DIVER has really upgraded its editorial and photographic content. There is no doubt in my mind that your publication has firmly established its number one position in its field. Personal opinions expressed on your pages come off as the words of experts rather than as sophomoric ramblings. Your photographs aren't a bunch of postcards . . . In short, your magazine looks like the work of professionals.

ERIC HANAUER
FULLERTON, CA

A Smoker Reforms

SKIN DIVER published an editorial entitled "Quit Smoking . . . Or Diving?" in September. I'm sure that many times your advice to readers is simply read and forgotten by the next issue . . . this is not always true.

My husband has been a moderate-to-heavy smoker for approximately nine years. No coaxing, pleading, or scare tactics have come close to persuading him to end this harmful, useless habit . . .

Three years ago he began diving and since then has taken advantage of every opportunity to "plunge into the deep blue."

However, upon reading your article on the ill effects of smoking on divers, a choice was made that may add years to my husband's life, or at least lead to healthier remaining years. He enjoyed smoking, but he enjoys diving also. Your article gave him a choice: quit smoking or quit diving.

Thanks ever so much to this article, he did choose to quit *smoking* — not diving. So please continue to print your sound

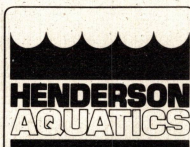
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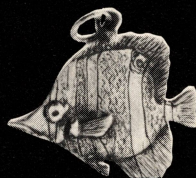
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in the February issue



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DECOMPRESSION STOP

advice because you never know when someone may read it and not forget it.

JACKIE GRAY
BOWLING GREEN, VA

Congratulations on your smoking-diving editorial. It gave me some insight on my recent collapse while snorkeling off Barbados — the dive that put me in the cardiac ward for open heart surgery.

I knew I had heart disease for some years, but felt that the limited exertion of snorkeling would enable my bad valve (aortic) and calcified aorta to handle the load. But when I picked up two bricks at 15 feet and started to carry them to shore, I was hit by the same panic syndrome symptoms you described in the smoker under diving exertion conditions. Involuntary hyperventilation almost did me in before I reached the shore. After that episode my heart developed new problems with arrhythmia. I'd like to warn divers with heart valve disease not to push their luck as I had done (and gotten away with for so many years — about seven).

BILL MILLER
ST. PHILIP, BARBADOS, W.I.

Scuba Quiz Correction

Dennis Graver should have quit while he was ahead. His mistake was in figuring that a cubical container, ten inches on an edge, has a surface area of 1000 square inches. Graver stated that 10 x 10 x 10 inches = 1000 square inches, when the product is really 1000 *cubic* inches. (The area of a cube equals the area of one face — 100 square inches — times six, the number of faces.) In working the problem, using the figure of 600 square inches was correct. . .

CHIP BISSELL
LOS ANGELES, CA

The October, 1980 issue of *SDM* contained a correction to question number 10 from the July, 1980 issue. Unfortunately, the correction was incorrect. I received a letter from a reader who suggested that 1000 square inches should have been used to figure the problem and because I was in a hurry, I did not refigure the problem. My mistake was assuming my well-meaning reader was correct. I then refigured the problem using the incorrect number for the total area of the cube and the rest is history. My apology for the misleading information. Many thanks to the other readers who wrote in to set the record straight. Oh, just for the record the original question and answer were correct as written with one exception — the container would need to be rigid and inflexible in order for the answer to be as shown.

DENNIS GRAVER

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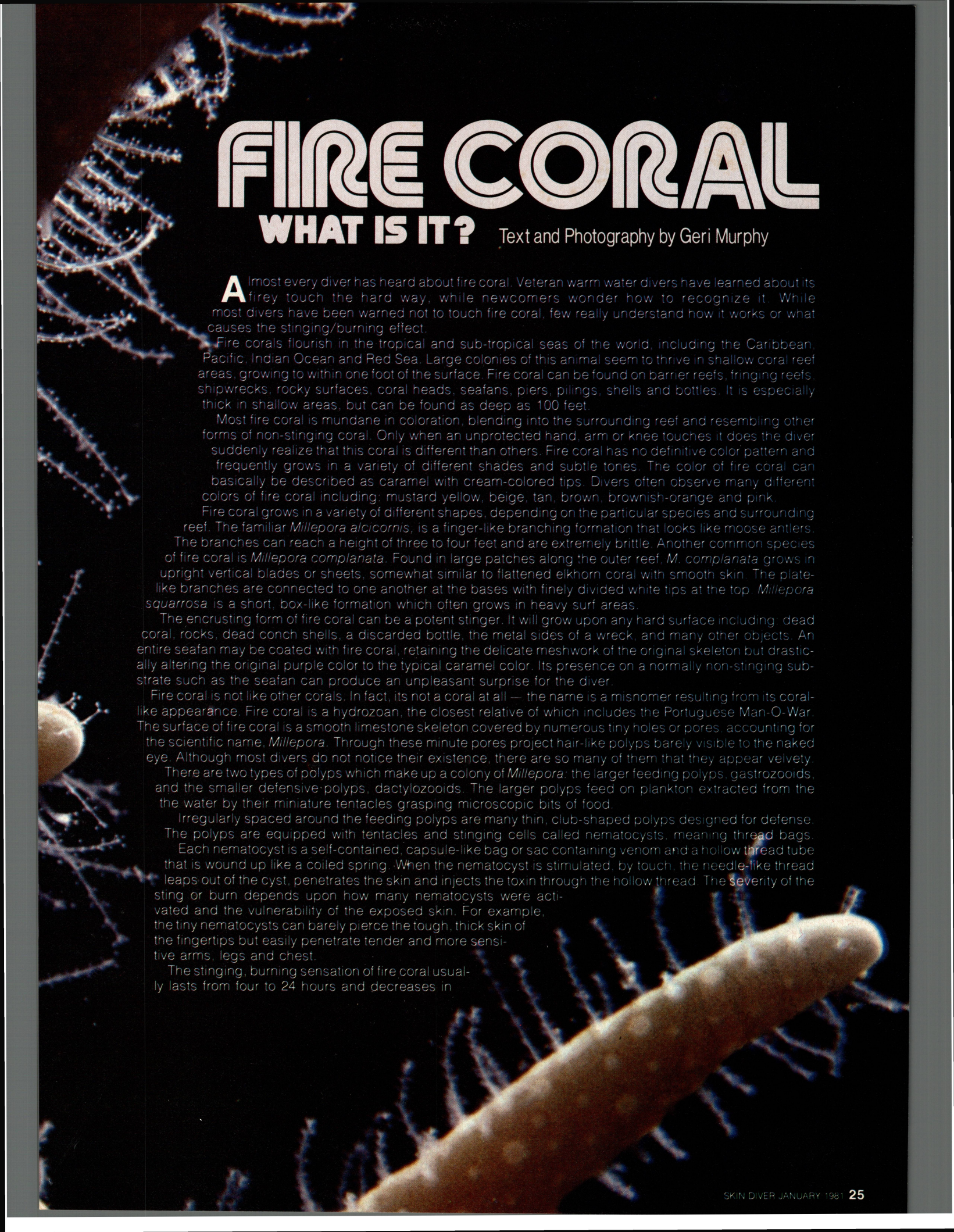
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FIRE CORAL

WHAT IS IT?

Text and Photography by Geri Murphy

Almost every diver has heard about fire coral. Veteran warm water divers have learned about its fiery touch the hard way, while newcomers wonder how to recognize it. While most divers have been warned not to touch fire coral, few really understand how it works or what causes the stinging/burning effect.

Fire corals flourish in the tropical and sub-tropical seas of the world, including the Caribbean, Pacific, Indian Ocean and Red Sea. Large colonies of this animal seem to thrive in shallow coral reef areas, growing to within one foot of the surface. Fire coral can be found on barrier reefs, fringing reefs, shipwrecks, rocky surfaces, coral heads, seafans, piers, pilings, shells and bottles. It is especially thick in shallow areas, but can be found as deep as 100 feet.

Most fire coral is mundane in coloration, blending into the surrounding reef and resembling other forms of non-stinging coral. Only when an unprotected hand, arm or knee touches it does the diver suddenly realize that this coral is different than others. Fire coral has no definitive color pattern and frequently grows in a variety of different shades and subtle tones. The color of fire coral can basically be described as caramel with cream-colored tips. Divers often observe many different colors of fire coral including: mustard yellow, beige, tan, brown, brownish-orange and pink.

Fire coral grows in a variety of different shapes, depending on the particular species and surrounding reef. The familiar *Millepora alcicornis*, is a finger-like branching formation that looks like moose antlers. The branches can reach a height of three to four feet and are extremely brittle. Another common species of fire coral is *Millepora complanata*. Found in large patches along the outer reef, *M. complanata* grows in upright vertical blades or sheets, somewhat similar to flattened elkhorn coral with smooth skin. The plate-like branches are connected to one another at the bases with finely divided white tips at the top. *Millepora squarrosa* is a short, box-like formation which often grows in heavy surf areas.

The encrusting form of fire coral can be a potent stinger. It will grow upon any hard surface including: dead coral, rocks, dead conch shells, a discarded bottle, the metal sides of a wreck, and many other objects. An entire seafan may be coated with fire coral, retaining the delicate meshwork of the original skeleton but drastically altering the original purple color to the typical caramel color. Its presence on a normally non-stinging substrate such as the seafan can produce an unpleasant surprise for the diver.

Fire coral is not like other corals. In fact, it's not a coral at all — the name is a misnomer resulting from its coral-like appearance. Fire coral is a hydrozoan, the closest relative of which includes the Portuguese Man-O-War. The surface of fire coral is a smooth limestone skeleton covered by numerous tiny holes or pores, accounting for the scientific name, *Millepora*. Through these minute pores project hair-like polyps barely visible to the naked eye. Although most divers do not notice their existence, there are so many of them that they appear velvety.

There are two types of polyps which make up a colony of *Millepora*: the larger feeding polyps, gastrozooids, and the smaller defensive polyps, dactylozooids. The larger polyps feed on plankton extracted from the water by their miniature tentacles grasping microscopic bits of food.

Irregularly spaced around the feeding polyps are many thin, club-shaped polyps designed for defense. The polyps are equipped with tentacles and stinging cells called nematocysts, meaning thread bags.

Each nematocyst is a self-contained, capsule-like bag or sac containing venom and a hollow thread tube that is wound up like a coiled spring. When the nematocyst is stimulated, by touch, the needle-like thread leaps out of the cyst, penetrates the skin and injects the toxin through the hollow thread. The severity of the sting or burn depends upon how many nematocysts were activated and the vulnerability of the exposed skin. For example, the tiny nematocysts can barely pierce the tough, thick skin of the fingertips but easily penetrate tender and more sensitive arms, legs and chest.

The stinging, burning sensation of fire coral usually lasts from four to 24 hours and decreases in

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FIRE CORAL

time. Fire coral stings often raise reddish welts in the area of contact, but this also disappears in time. The stinging effects can be minimized by the application of alcohol or ammonia. The easiest way to avoid the unpleasant sting is to wear protective clothing. In warm water, a one-eighth inch wetsuit, covering the arms, legs and torso, is ideal. A long-sleeved shirt and long pants also provide the needed protection.

The next time you pass a fire coral branch, pause for a moment to observe this clever hydrozoan at close (but not too close) range. If you view it from just the right angle, you may be able to see the individual polyps and tentacles protruding from the many pores of this creature. It's worth a look, for *Millepora* is one of nature's wonders. ➤

DACOR A/V PROGRAM

Dacor Corporation of Northfield, IL, has contracted with Jack M. Sell Associates, Ltd., of Chicago, to produce an audio/visual program on Dacor and scuba diving. Dacor manufactures and

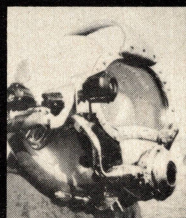


From left to right are: Phil Lanier, Sam Davison, Jack M. Sell and Peter H. Pollard.

distributes state of the art dive equipment, and intends to use the program as a marketing device at trade shows and in over 1500 scuba specialty stores worldwide.

Entitled, *The Professionals Choice*, the 12 minute program combines slides of underwater adventure, Dacor's facilities, and underwater pool shots with a recorded sound track. Among the interesting shots taken in Northfield are several of Dacor's unique hyperbaric chamber, used to test equipment under high pressures and workloads. The techniques used in shooting this chamber provide a three dimensional effect.

Peter H. Pollard of Jack M. Sell Associates, Ltd. produced the program. Phil Lanier wrote the script. Fred Blurton did topside photography, with Doug Daniels shooting underwater. ➤



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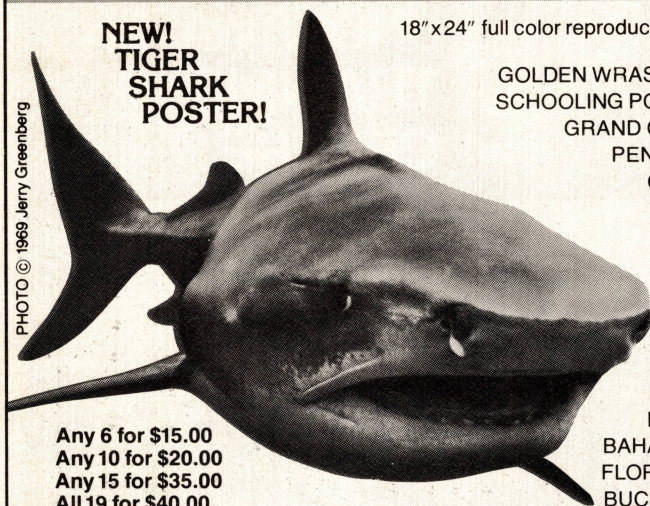
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DIT STUDENT POPULATION EXPLOSION

John W. Manlove, president of Divers Institute of Technology, Inc. (DIT) in Seattle, Washington reports that in the last several months the institute has experienced a tremendous growth in student population. New enrollments for classes which started in August and September hit record highs. Normally the school has a student body of approximately 75 to 85 students in five separate classes. That count recently increased to 115 full time students, and new applications for future classes are being received in accelerated numbers.

In order to accommodate such increases, and to maintain the high quality education it offers, DIT has constructed new classrooms and added to its inventory of dive equipment. Also, new faculty and administrative staff members have recently been hired. For more information, write to the Divers Institute of Technology, Inc., 4601 Shilshole Avenue, N.W., P.O. Box 70312, Seattle, WA 98107. 🐠

BAILEY APPOINTMENT

Nanci R. Bailey has been appointed sales and marketing manager for Sports-ways Waterlung. She will have total re-



sponsibility for management of all sales and marketing functions, both domestic and foreign. President Paul Chesney comments that Nanci's background in athletics will enhance the company's overall operations. Nanci has plans to stress the name WATERLUNG, rather than the 22 year old Sportsways, because WATERLUNG relates better to the dive industry. 🐠

KRITTER LABS MOVES

Jack and Sue Drafahl have moved their business, Kritter Labs, to the Portland, Oregon area. Kritter Labs is the sole manufacturer of the electronic handle, a macro flash system for the Nikonos camera. You may now contact them at: P.O. Box 88, Hillsboro, OR 97123, (503) 648-3311. 🐠

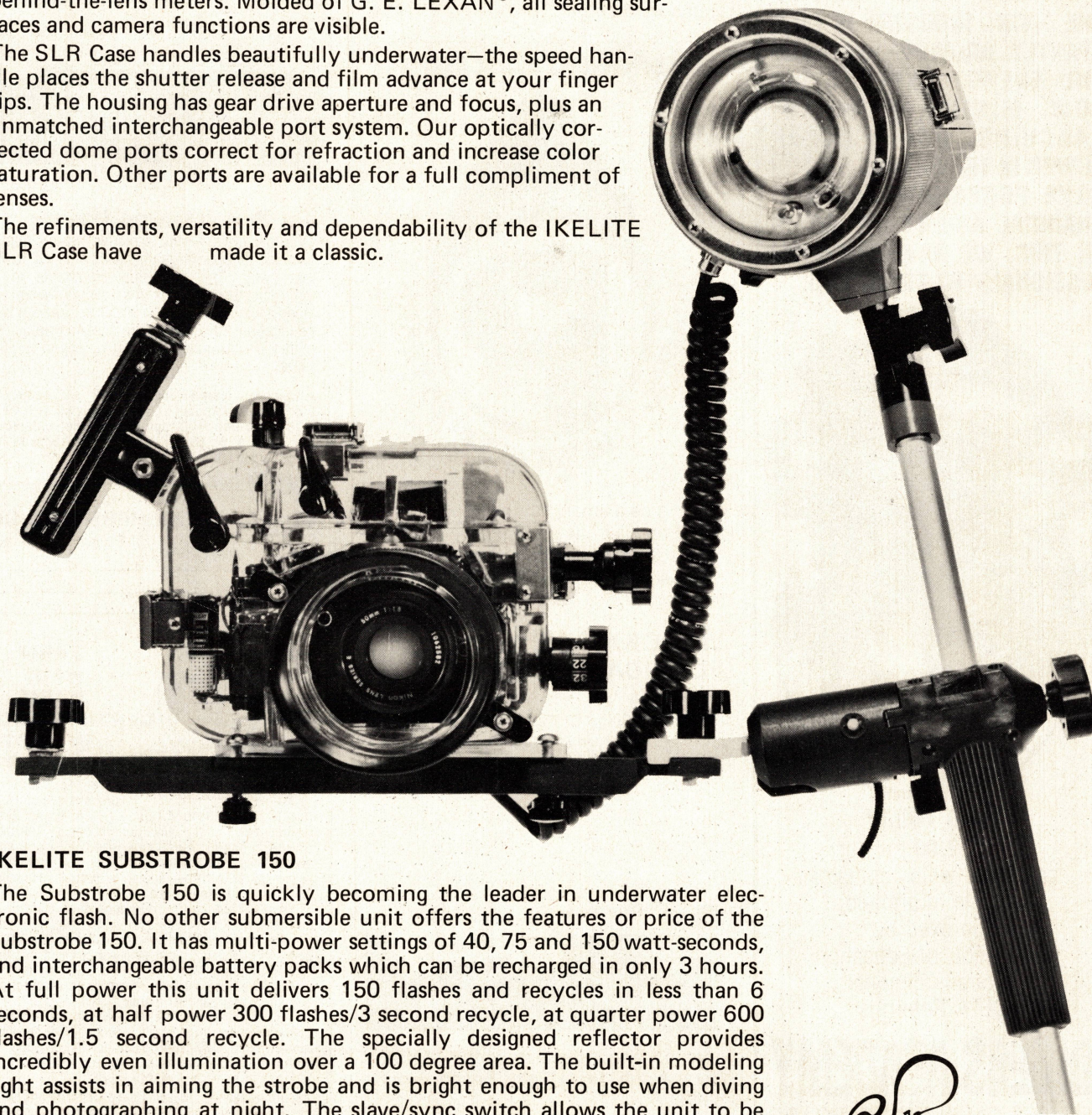
THE SYSTEM

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The Substrobe 150 is quickly becoming the leader in underwater electronic flash. No other submersible unit offers the features or price of the Substrobe 150. It has multi-power settings of 40, 75 and 150 watt-seconds, and interchangeable battery packs which can be recharged in only 3 hours. At full power this unit delivers 150 flashes and recycles in less than 6 seconds, at half power 300 flashes/3 second recycle, at quarter power 600 flashes/1.5 second recycle. The specially designed reflector provides incredibly even illumination over a 100 degree area. The built-in modeling light assists in aiming the strobe and is bright enough to use when diving and photographing at night. The slave/sync switch allows the unit to be fired by another strobe if desired. Check these features and the price of the Substrobe 150 at your local IKELITE dealer.

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The IKELITE Quick Handle I is a versatile accessory providing one hand control. A ball socket adjustment provides infinite variations in lighting. The quick release lever allows the unit to be removed, hand held, and remounted underwater. The 22 inch extension arm can be adjusted to varying lengths for added control.


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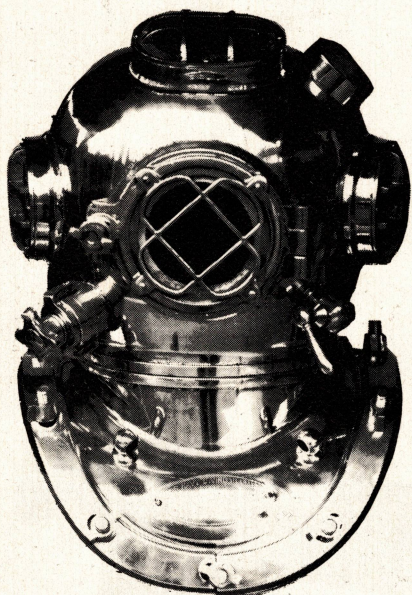
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PARKWAY'S 25TH ANNIVERSARY

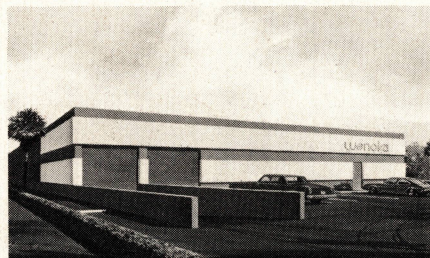
Parkway Fabricators, one of the most respected and best known names among water sports enthusiasts, celebrates its 25th year of service in 1981.



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WENOKA'S NEW FLORIDA PLANT

Wenoka Cutlery has expanded its present facility to include a new site in Florida. According to Joe Zel, president, the new site began operations in December. The new plant, located on an



acre of land, is situated at 1134-53rd Court North, West Palm Beach, Florida 33407.

Jerome D. Zel, current vice president of operations, will become chief executive officer of the new Florida operations. Slated for the new plant are the functions of marketing, customer service, accounts receivable, warehousing and distribution. The expansion is designed to increase service to Wenoka dealers across the country.

The executive offices of Wenoka Cutlery will continue to operate at the current address of 85 North Ave., Natick, MA 01760. (617) 655-2615.

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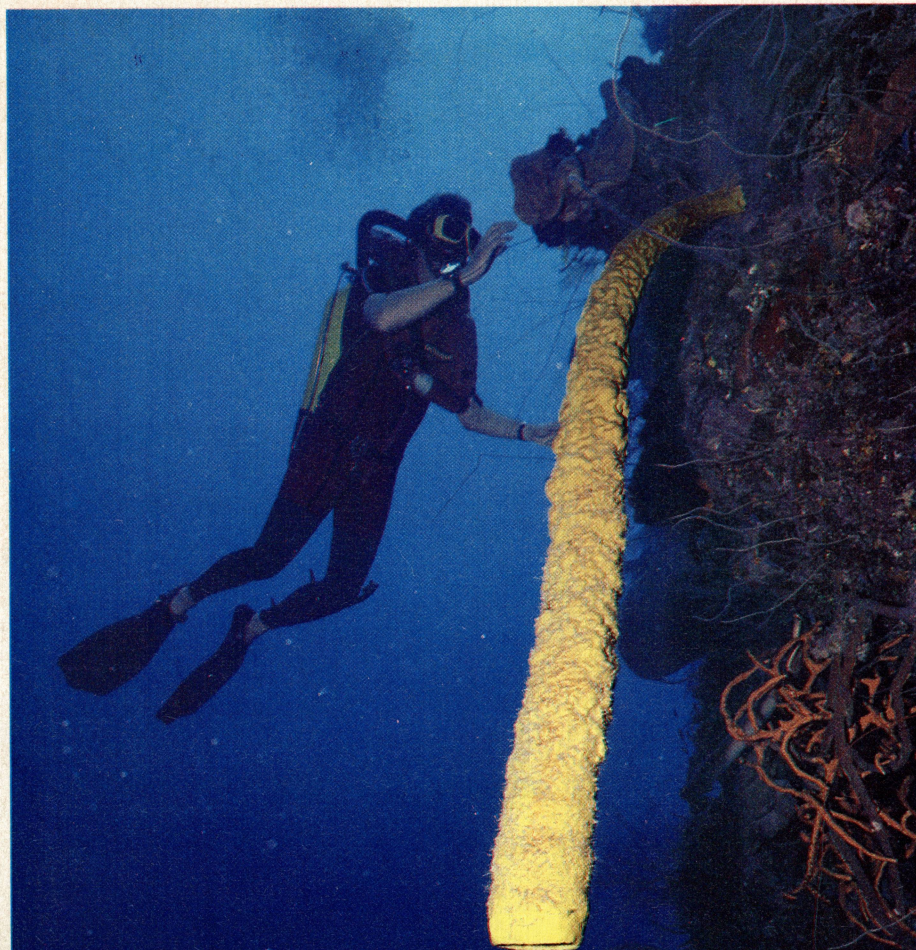
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UNDERWATER CANADA '81

Underwater Canada '81, with master of ceremonies, Dr. Sylvia Earle, will be held March 27-29, at the Skyline Hotel, Toronto. Underwater films, internationally known speakers, exhibits and displays, workshops, Pirates of the Caribbean casino and dance, and a cruisewear and wetsuit fashion show are the featured events. Tickets and information may be obtained by writing: Ontario Underwater Council, 160 Vanderhoof Avenue, Toronto, Ontario, Canada M4G 4B8. 🐠

FSDA U/W FILM FESTIVAL

The XIII FSDA Film Festival will be held February 27, 28 and March 1, at the International Inn, Tampa, Florida. Reservations can be made in the name of FSDA at special rates until Jan. 20. Categories for entry include: 1) Salt Water Slides; 2) Salt Water Color Prints; 3) Salt Water B&W Prints; 4) Fresh Water Slides; 5) Fresh Water Color Prints; 6) Fresh Water B&W Prints; 7) Movies — Fresh or Salt Water; 8) Creative.

The entry fee is \$4 per entry, per category. The deadline for entries is January 26. Mail entries to: Buddy Stokes, 4509 Leona, Tampa, FL 33609. 🐠

PADI PHOTO INSTRUCTOR COURSES

PADI sponsored seminars on how to teach underwater photography will be offered in two day sessions across the country in 1981, taught by professional photo instructor Dick Jacoby.

The 24 hour program is designed as both an advanced course in underwater photography, and an intensive program on how to teach the subject. Students will learn advanced theory and photo technique, equipment and teaching aids, teaching techniques, curriculum design, planning the first course, source materials and equipment sales, basic repair, slide show production, and course marketing and sales. Students are involved with discussions, slide shows, lectures, teaching aids, in-water photography, quizzes, taped dramatic presentations, and more.

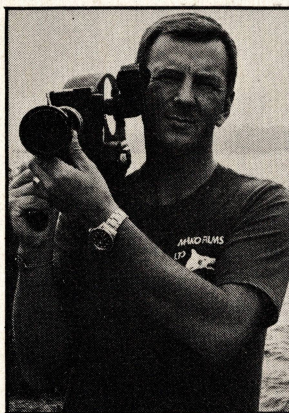
The course schedule for 1981: January 15 & 16, Las Vegas, NV; February 7 & 8, San Francisco, CA; February 28 & March 1, New Orleans, LA; April 11 & 12, Houston, TX; May 4 & 5, Chicago, IL; June 6 & 7, Toronto, Canada; July 11 & 12, Miami, FL; September 26 & 27, Denver, CO; October 17 & 18, Atlanta, GA; November 14 & 15, St. Louis, MO. For information, write: Dick Jacoby, 4915 Pershing Road, Downers Grove, IL 60515. 🐠

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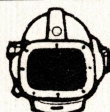
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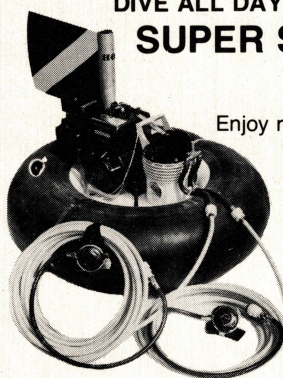
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BAJA FILM AT DEMA

Diving Mexico's Baja, a film by Lenora E. Carey, explores the remote sites and facilities in Baja California. It will premiere at the DEMA Convention in Las Vegas, January 17-21. Key locations throughout the Sea of Cortez, including the largest living coral reef in the gulf, all within the geographic reach of North American divers, are featured in this documentary. Inquiries concerning the film should be addressed to: Lenora E. Carey Productions, P.O. Box 1211, Ventura, CA 93001.

SHIPWRECKS IN FILM FESTIVAL

The fourth annual film festival — Shipwrecks IV — sponsored by the Ford Seahorses Scuba Diving Club, will be held on Saturday, February 21, at the Ford World Headquarters Auditorium of Ford Motor Company in Dearborn, MI. Write Chuck Feltner, 166 S. Lafayette, Dearborn, MI 48124 for information.

SEA OTTER/SHELLFISH FORUM IN CA

A regional forum entitled: Management of Sea Otters and Shellfish Fisheries in California; Policy Issues and Management Alternatives will be held January 9-10. The seminar will feature presentations by experts in the social sciences and humanities, and discussion of the issues among agency representatives, special interest groups, and the general public. The forum will be held at the South County Regional Center, Arroyo Grande, San Luis Obispo County, California. For reservations or information write: John Richards, U.C. Marine Advisory Program, Cooperative Extension, 260 North San Antonio Rd., Santa Barbara, CA 93111.

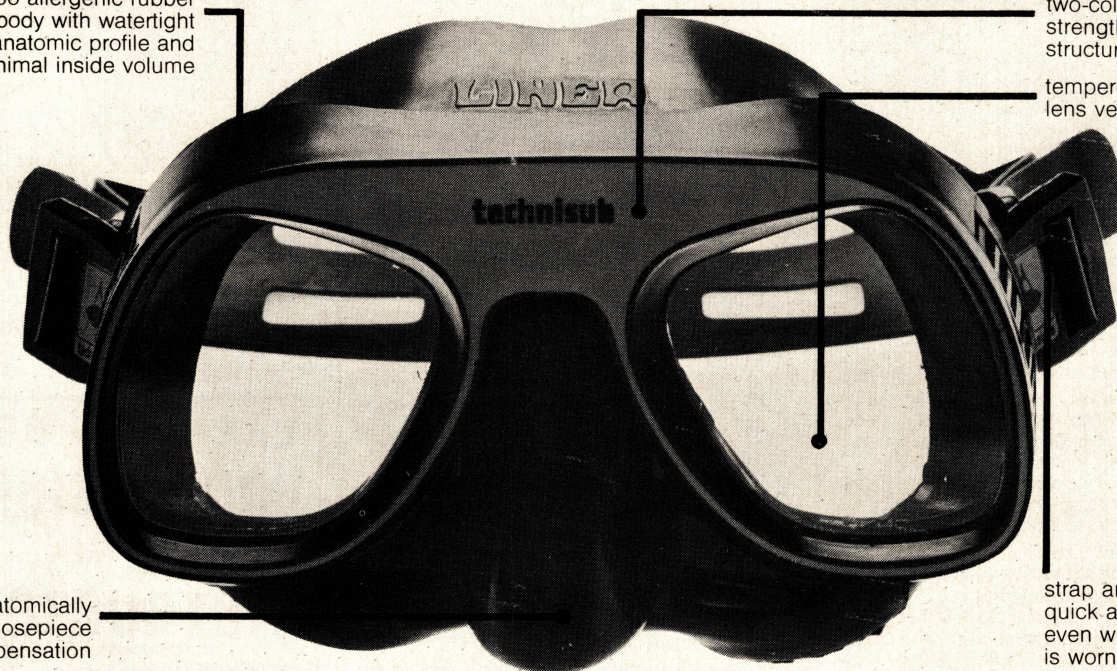
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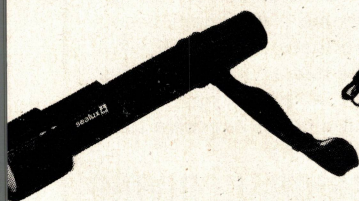
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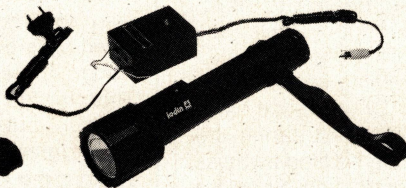
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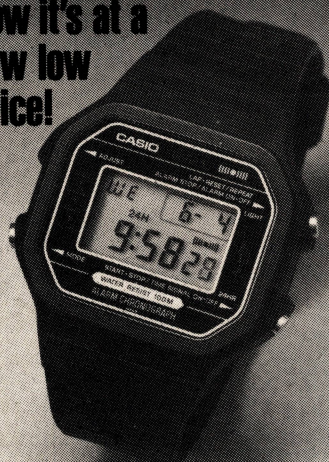
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U.S. AQUA SPORTS, INC.

On January 1, U.S. Nemrod, Inc., officially became U.S. Aqua Sports, Inc. The purpose of the name change was to better represent the expansion of its line of water related products to include additional lines. President Kenneth A. Brown stated that the name change does not affect its representation of the Nemrod Metzeler line of Nemrod underwater equipment throughout the U.S. While dropping the Nemrod name as part of its corporate identification, U.S. Aqua Sports will continue to offer its Nemrod customers genuine Nemrod products, parts and service, under the Nemrod name, from its new office and warehousing facilities in North Haven, Connecticut.

For further information on the Nemrod line of underwater equipment, please consult your local dive shop or contact Al James, vice president of sales, U.S. Aqua Sports, Inc., 25 Bernhard Road, North Haven, CT 06473.

BONAIRE MEDICAL SEMINAR

An Advancing Course on the Medicine of Sport Scuba Diving will be held in Bonaire, Netherlands Antilles, February 7-15. This course will emphasize otolaryngology in diving, and stress medical problems related to divers.

The meeting will be held at the Flamingo Beach Hotel and a complete dive program is included. Meeting coordination and travel arrangements are being arranged by Helen Turcotte of Medical Seminars, Inc. For a brochure and academic schedule write: Jefferson C. Davis, M.D., Hyperbaric Medicine, P.A., Methodist Plaza, 4499 Medical Drive, San Antonio, TX 78229.

LOST PADI CARDS

In the past, obtaining replacement certification cards might have been troublesome. However, beginning in October, 1980, each permanent PADI positive identification certification card issued at the various training levels was accompanied by a PADI validation card. Although the validation card cannot be used for diving, it should be filed away as a permanent record of training. Should a card be misplaced, a replacement card may be ordered by submitting to PADI Headquarters a photocopy of the validation card, an I.D. photo one and one-half by two inches, and the appropriate replacement fee indicated on the card. Replacement cards may be obtained from: PADI Headquarters, Research Department, 2064 North Bush Street, Santa Ana, CA 92706.

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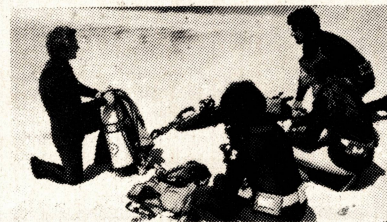
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The new course emphasizes those skills that can help make diving an enjoyable adventure, rather than an underwater endurance contest. In it, divers will learn how to calculate their individual air consumption rates and thus avoid out-of-air emergencies. Divers will also learn how to avoid getting lost underwater by use of natural and compass navigation. A deeper water dive will provide a helpful review of the use of the Navy no-decompression tables and all important buoyancy skills.

Emphasis in the course is on fun and enjoyable diving. Other activities, such as marine life or aquatic life identification and dive site selection will, therefore, also be covered. NAUI instructors will tailor the program to the particular students in the course, providing an enjoyable refresher course with the added advantage of qualifying for NAUI's new openwater certification materials. The new materials include a photo ID card, colorful wall certificate, jacket crest and window decal. For details contact: NAUI Headquarters, P.O. Box 630, Colton, CA 92324.

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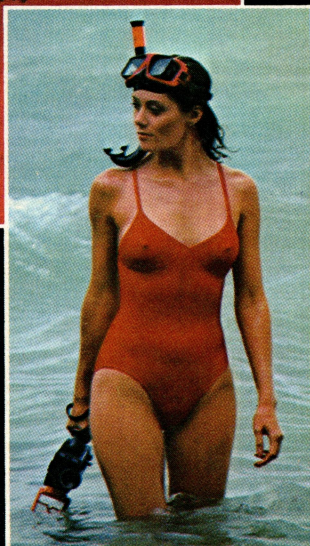
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FLOWER GARDENS CONTROVERSY

Discharge of petroleum drilling fluids to the northwest Gulf of Mexico is not presently endangering the area's rare coral reefs, according to the results of an ongoing study by two Florida Institute of Technology scientists. Just how close drilling operations can push toward the Flower Gardens reef communities with-

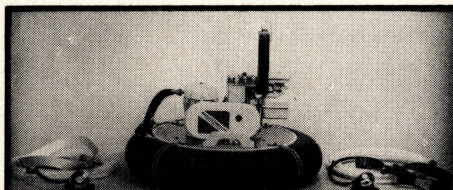


Chemical technicians Bob Trocine (left) and Brand Weichert prepare a sediment sampler for use near a drilling rig in the Gulf of Mexico.

out causing harm remains to be determined, say chemical oceanographers Dr. John H. Trefry and Dr. Richard H. Pierce Jr. The researchers base their conclusions on data and samples collected during three scientific cruises over the past nine months, entailing 34 days at sea.

The research, conducted under a \$140,000 federal grant, was jointly authorized by the National Oceanic and Atmospheric Administration and the U.S. Environmental Protection Agency. The F.I.T. study, designed as the first part of a project expected to continue for at least one more year, is only a portion of a major investigation of the reef area and man's impact on it. Scientific information collected can be used in other considerations of drilling operations, including those off Florida's East Coast.

Pierce said a second phase of the research program will determine the potential impact of mud from drilling operations in closer proximity to the reef than those now in existence. Experiments will be designed to actually test reef responses without damaging the natural treasure. >>>



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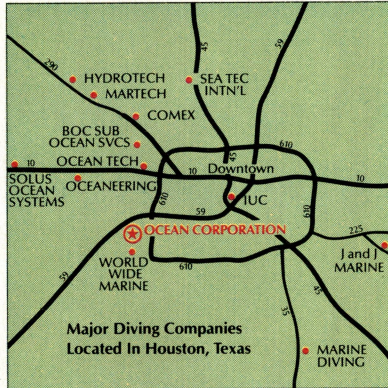
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The Ocean Corporation is located in Houston and more commercial divers are hired in Houston than in any other place in the world. Twelve diving companies are located in Houston including three of the four largest in the U.S. Many others are located in the nearby New Orleans area. The demand for divers is so great in Houston that large locally based diving companies like Ocean Systems, Hydrotech Systems, Martech International and Sea Tech International have hired many of our students for part-time work while they were attending school. Over 90% of our recent graduates went to work for these and other local diving companies when they completed our program. Houston is the place where the action is...the commercial diving, offshore construction and oil industry capital of the world.



BECAUSE

The Ocean Corporation is a commercial diving company, not just a school. Our facilities, equipment and training aids are the best, and our diving systems are as up-to-date as possible... because much of the equipment is used by our diving operations division to perform actual diving contracts in the field. Ocean Corporation has successfully completed many underwater jobs for various industrial clients over the years... including specialized underwater inspections, maintenance and repair work. For example, we did the world's first commercial underwater repair job in a nuclear power plant. And most of our divers have been graduates of our own school.



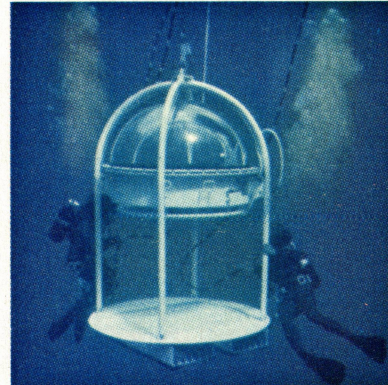
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The Ocean Corporation is a convenient and exciting place to go to school. Houston is one of the fastest-growing and most dynamic cities anywhere. It is a city of expansion, energy and youth (the average resident's age is in the mid-20's). Houston offers every conceivable kind of entertainment, from sports events, ultra-modern discos and open-air theater to rough-house local rodeos, chili cook-offs and the new Texas-size country-western dance clubs. Reasonably priced adult and singles apartments are readily available within walking distance of the school, and fast-food to luxury restaurants are nearby. The semi-tropical climate is wonderful, the sport diving is great and the folks are friendly.



BECAUSE

The Ocean Corporation management and instructor staff have long-term experience in the international offshore oilfield diving business. Retired ex-military divers and sport scuba divers don't run the school...commercial divers do. For example, the President of The Ocean Corporation, Larry



Cushman, was Vice President and Europe/Africa Area Manager for Ocean Systems, Inc. for three years...with responsibility for all North Sea diving and underwater construction operations. He also worked six years as a manager for Oceaneering International, Inc., another of the world's largest commercial diving contractors. Ocean Corporation managers and instructors know today's diving business...first-hand, from recent experience.



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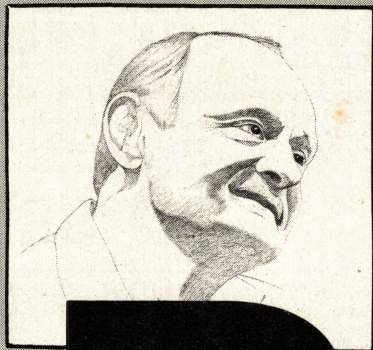
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RX FOR DIVERS

BY CHARLES V. BROWN, M.D.

paraplegics. He writes to sound a note of caution. Aside from complete or partial paralysis of their limbs, cord-injured people may have serious problems with thermal regulation and with ventilation — both can be critical in diving. He strongly advises consultation with a physician knowledgeable in diving and physical medicine before undergoing scuba training.

A MEDICAL MYSTERY SOLVED

For eight years Fred Pfiel survived the rigors of New England diving without incident. Then he began getting strep throat after every dive. The doctors always cured it, but threatened him with a tonsillectomy if it kept recurring. That

and disinfected his snorkel and BC mouthpiece, too. No trouble since. The solution used was Cidex, which is two percent glutaraldehyde. It's commonly available in hospitals.

Question: A melodrama in Maryland — married only three months and already there's a triangle. She loves him and he loves her, but he has another mistress — the undersea. Frenchmen and Angeleños may shrug — all that's needed for a successful *menage a trois* is compatibility. The villain is her doctor. She takes inderal for a heart condition, and he says no diving. She'd like another opinion.

Answer: Diving involves many stresses, for example, blood shifts, cold, and exertion, that can make heart prob-

This column has reported several times on scuba training for people with spinal cord injuries. Dr. Bruce Baker of Ohio State University specializes in physical medicine and rehabilitation, and has taught scuba diving to

didn't sound like much fun, so he nosed around for alternative strategies. Some people at the hospital where he worked suggested disinfecting his regulator. That didn't solve the problem. The next time he decided to cover all the bases,

lems worse. Inderal inhibits the sympathetic nervous system, and substantial doses seriously limit your ability to cope with stress.

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RX FOR DIVERS

more about your case — the nature of your heart condition, the dose of inderal, various personal factors, and so on. You should definitely get clearance from a physician trained in dive medicine before signing up for a course. If it doesn't work out, you can still keep an eye on hubby. Dive boats are always looking for good cooks.

Question: J. I. Gilden, a 60 year old businessman in Marion, Ohio, knows how to use his spare time. Returning from India, he took advantage of the stopover in Hawaii to dive Hanauma Bay. It's the flooded crater of Koko Head, a marine sanctuary where you can practically rub snouts with the naturally finned population. Sadly, he rubbed his shin on a rock, and came off with several abrasions. They were small, and he ignored them.

The abrasions were slow to heal. In a week they were itching, and in three weeks one that had seemed to heal became red and tender. The leg swelled from ankle to knee, and his fever mounted to 104 degrees. The upshot was 28 days in the hospital getting intravenous antibiotics for osteomyelitis of the tibia (shin bone). Mr. Gilden wants to know if his experience was unique, and how it could have been avoided.

Answer: Scrapes and cuts acquired in the sea are notorious for infection and slow healing. Bad bugs abound, and the marine life that encrusts every surface can cause toxic reactions and reduce tissue resistance. The best defense is avoidance — be careful, or wear protective clothing. Some do refuse to get wet without their armor, but many of us like the feel of the water on our bare skin and are willing to accept some risk. It's not a large risk if scrapes are taken seriously. The main thing is thorough cleansing. Soap and water to remove contaminants are usually all that's needed. Hydrogen peroxide to destroy any residual material adds insurance, as does antibiotic ointment to fight germs. Sometimes addition of a steroid cream is appropriate to reduce inflammation.

Shin injuries are especially prone to infection because circulation is relatively poor, and they impose an increased risk of osteomyelitis because there's hardly any tissue between skin and bone. With age, the circulation shrinks and the risk grows. Therefore shin scrapes, even if minor, deserve special care. Clean and redress them frequently, and keep them covered. Otherwise your trousers sandpaper them and rub in more germs.

Bone infections are always tough to cure, and shin bone infections are among the most stubborn. If standard treatment doesn't produce a prompt favorable response, request consultation

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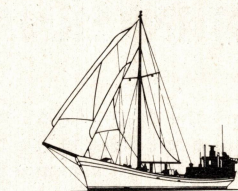
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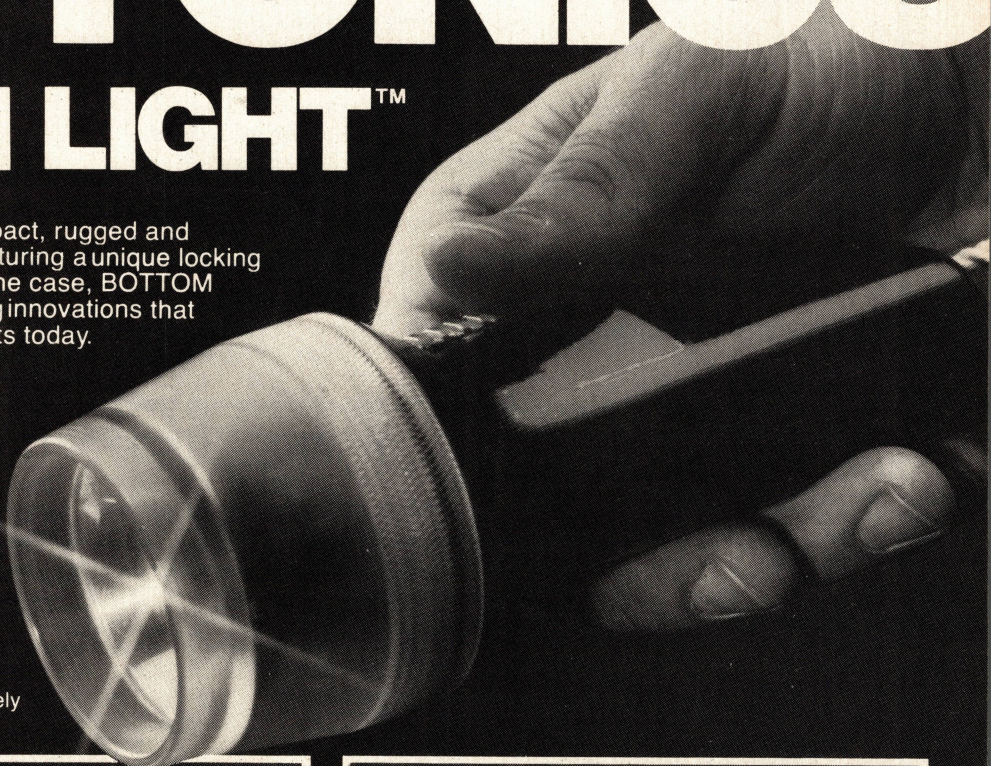
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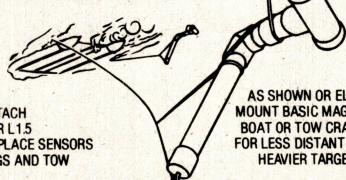
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Question: To be in Bermuda and not dive? The thought is repugnant to Joe Fishman. He's been diving for 30 years and can't see quitting just because of coronary bypass surgery. For 15 of those years he's been taking medicine to counter hyperlipidemia — elevated cholesterol and triglycerides in the blood. Nonetheless, his coronary arteries gradually narrowed to where they couldn't supply the heart muscle with enough blood, and he began to experience the chest pain called angina pectoris. The bypass operation cured it. He now walks eight miles every day and swims half a mile every other day. Must he content himself with the upper half of Bermuda?

Answer: The issue of how safe it is to dive after coronary bypass surgery is highly controversial. Most authorities say no, either because of conviction or medicolegal concern. Your age and blood chemistry put you at high risk for coronary disease, which favors heart attack and cardiac dysrhythmia. Diving favors at least the latter. Both are more likely to be fatal if they occur in the water.

On the other hand, maintaining the exercise program you describe implies a good level of cardiovascular fitness, and that's a strong plus. So strong that we'll go out on a limb and opine that you can probably dive safely. For insurance, dive only when you feel well, and avoid hard exertion, cold exposure, and stimulants such as caffeine. This conditional approval is only for now. Some of the factors that led to your coronary disease are still operating, so keep in close touch with your doctor about future diving.

Question: Michael Campion writes from Pelham, New York, for information about the influence of diving on the sex of offspring. He's been advised to dive a lot if he wants to have a boy.

Answer: Anecdotal evidence holds that when the diver is a British Navy man, more girls are begotten. Experiments at the University of North Dakota indicate the same when the diver is a male mouse. On the other hand, Bolton's survey showed a predominance of boy babies when the diver is an American mama. Data for Italian and Zulu divers are not available. So far, the United Nations has not seen fit to fund a definitive study.

Question: Mark Sandel of St. James Park, New Mexico, was hit in the eye by an apple, causing a hyphema — an accumulation of blood within the eyeball. Can he safely resume diving after recovery?

Answer: Yes. 

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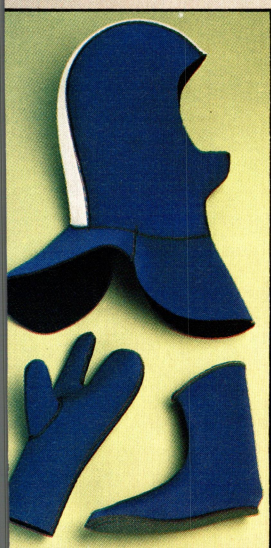
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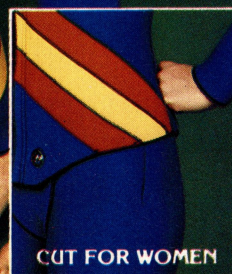
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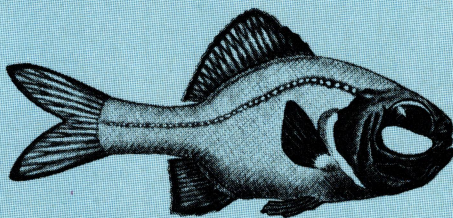
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The Flashlight Fish

(*Photoblepharon palpebratus*)

P*hotoblepharon* (eyelid light), and *palpebratus* (blinking), is the big scientific name for the little fish that may be best described as the underwater firefly of the Red Sea. The flashlight fish, as it is commonly called, is one of the few bioluminescent animals of any ocean, and is one of four species of the fish family Anomalopidae. (The word Anomalopidae comes from the Greek for abnormal eye.) These fishes have large, luminous organs located under the eyes that look like little half-moon compartments. These organs contain a light generating bacterium that shares a symbiotic relationship with the fish. The fish plays host to bacterium (which cannot survive apart from the fish) and the bacterium provides the host fish with an effective survival tool. The light is quite brilliant, and has been described as being as strong as a weak flashlight. There is a black eyelid that comes up from below to cover the light, and this creates the blinking effect. □ John McCosker, director of the Steinhart Aquarium, San Francisco, is one scientist who has studied the flashlight fishes extensively and he indicates that the blinking is used by the fish for several reasons: to find and attract prey, to communicate with other flashlight fish, to confuse predators, and to light their way in the dark. Flashlight fish are tiny (a maximum of four inches) deep-water dwellers, usually found in 300 feet or more, and only come out of their hiding places at night, when there is little or no moonlight. A light aimed at a flashlight fish will almost paralyze it, and ichthyologists use handlights to collect the fish. According to McCosker, the flashlight fish forages at night for small crustaceans and plankton. When they feed they usually swim together in a big school, which looks like a swarm of blinking lights in dark water. The



blinking rate goes up significantly when they feed, and it is believed that the blinking is not only an attractive lure to the prey, but a signal to each other about the food. McCosker also observed *Photoblepharon* using its flash to foil predators. The fish would flash its light, startling its pursuer, then blink off its light and dart off in a different direction. "Blink and run" is what another ichthyologist (James Morin) called this particular behavior. □ The exact distribution of *Photoblepharon* is not completely known at present, but it is known from the Red Sea, Comoro Islands, Philippines and Indonesia. Because of depths at which the fish is normally found, and because it usually comes out only on dark, moonless nights, ichthyologists suspect that they may just not have seen the fish where it occurs. ("Deep diving in tropical seas on dark nights with one's dive light turned off is rarely practiced and never enjoyed," writes McCosker.) On single occasions other species of the Anomalopidae family have been seen in the Sea of Cortez and in the Caribbean, but these sightings have not recurred since the first discoveries. *Anomalops katoptron*, a species similar to *Photoblepharon*, is found from Japan to the Philippines, Indonesia and Melanesia. It differs from *Photoblepharon* in that the light organ beneath its eye rotates into a pocket. The data and knowledge of the flashlight fish is relatively new to both the scientific and lay world. McCosker cites an incident during the 1967 Arab-Israeli conflict when Israeli soldiers on midnight patrol along the Red Sea spotted a green, glowing mass surfacing offshore. Thinking they were seeing enemy frogmen, they fired off explosives at the light and almost instantly the beach was littered with small, dark fishes with glowing heads. ✎

Photo By Jack McKenney - Text By Hillary Hauser

McKenney photographed the flashlight fish at Howard's Temple, Red Sea, in 45 feet of water at night. He used a Nikon F, 55mm micro lens, in a Farallon/Oceanic housing, Farallon/Oceanic strobe. F16, 10" away.



NOGI AWARDS

*Lee Tepley-Arts, Charles W. Shilling-Distinguished Service,
Jim Brown-Sports, Roger Cook-Science By Kelly O'Loughlin*

The NOGI Award story begins in the late 1950's. The setting: New Orleans; the capital of jazz, home of soul, and headquarters for some of the finest seafood chefs in the world. The waters off New Orleans' Grand Isle were chock full of fish, leading local fishermen to promote an annual spearfishing contest. This became known as the New Orleans Grand Isle Meet, hence NOGI.

But the contest didn't remain a "locals-only" event — instead, the Underwater Society of America agreed to sponsor the meet on the advice of two of its members: Jay Albeanese, Jr. and Louis Cuccia. Jay and Louis were the adoptive fathers of NOGI. They headed up the Society's Award Committee and chose the hand-carved statuette as the official symbol of the awards.

The NOGI Awards have been honoring leaders in the fields of Underwater Arts, Science, Education/Sports and Distinguished Service since 1960. The Society's objective is, "to magnify and implement the individual diver's wants and needs in the areas of legislation, insurance, anti-pollution, special interests and to acknowledge those people who have contributed greatly to the under-

water world."

The latest winners have been chosen for their unique contributions to diving, and their promotion of concern for the sea and its inhabitants. The winners are: Lee Tepley, Ph.D.; Charles W. Shilling, M.D.; Jim Brown and Roger Cook.

LEE TEPLEY—ARTS

Lee Tepley is a master filmmaker; he has created an impressive series of exceptionally beautiful underwater films illustrating the glory of the sea, and the tragic destruction being caused by man. Tepley's most notable films include: *Fire Under the Sea*, a documentary of the first and subsequent expeditions of scuba divers viewing active lava flows underwater; *Cloud Over the Coral Reef*, documenting the ecological changes caused by various types of pollution which are leading to the destruction of coral reefs in the Pacific; and *Medusa*, an odyssey of innerspace featuring the giant pulsating jellyfish, *Medusae*, accompanied by a sound track similar to that used in the film 2001.

Tepley began diving in 1950 while pursuing his Ph.D. in Physics at UCLA. Abalone provided a mouth-watering diversion from the standard student fare, so he spent his weekends underwater off the Palos Verdes coast.

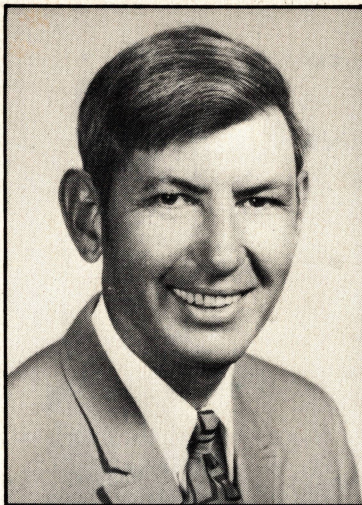
He moved to Northern California in 1959, where he remained through 1968. His position at the Lockheed Palo Alto Research Laboratory involved space physics, and led to several projects entailing the measurement of sounds from outer space at field stations on the Pacific Islands of Kauai, Canton Island, and Tongatapu. While working on the islands he became interested in underwater photography. In 1968 he combined his job and hobby by initiating a project in underwater scientific photography for Lockheed.

Tepley continues to consult for Lockheed when he's back home in Northern California, but his major interest is underwater filmmaking. He is currently occupied with the filming of blue, humpback, and gray whales for educational films. His affinity and compassion for the living sea enable him to capture the fragility of the world's most eminently perishable asset — the sea.

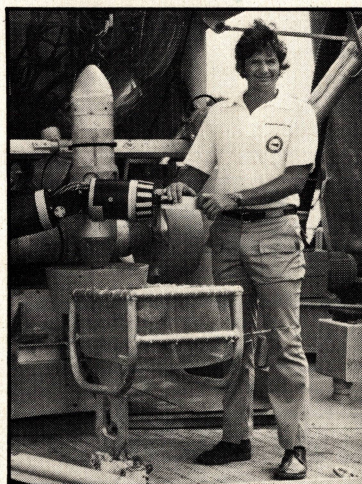
CHARLES W. SHILLING, M.D. DISTINGUISHED SERVICE

Dr. Charles Shilling's early work in submarine and deep diving research preceded many of the procedures used today. Because of his life-long interest in submarines and submarine rescue, he made many important contributions to the development of safety, salvage, and escape equipment for submarines.

Shilling became a U.S. Navy Medical Officer in 1927, the same year he earned



Jim Brown



Roger Cook



Charles W. Shilling, M.D.



Lee Tepley

his M.D. from the University of Michigan. His name soon after became synonymous with the care of divers and submariners, and with underwater research and development, and remained so for the next 28 years.

Shilling was medical officer in charge of the rescue from the U.S.S. *Squalus* in 1937. For nine years, during and shortly after WW II, he directed the Submarine Medical Research Laboratory at New London. In 1947, he moved to the Office of Naval Research, where he was responsible for the medical, biological and psychological programs. In addition, during the last two years of this tenure he was Director of the Research Division, Bureau of Medicine and Surgery. His last two years in the Navy were spent at the U.S. Naval Academy, where he was Senior Medical Officer of the Academy, Head of the Department of Hygiene, and Command Medical Officer of the Severn River Naval Command.

Following his retirement from the Navy in 1955, Shilling spent five years as Deputy Director of the Division of Biology in Medicine with the Atomic Energy Commission. In 1960 he became Director of

the Biological Sciences Communications Project, first under the American Institute of Biological Sciences and later under the George Washington University Medical Center.

Virginia-based Shilling became Executive Secretary of the Undersea Medical Society in 1974. Because of his dedication, UMS has doubled its membership to over 1000 and has multiplied its publications and activities. The UMS is now a major force for progress and understanding in the diving world.

JIM BROWN—SPORTS/EDUCATION

Jim Brown is one of the most active members of the fraternity of divers. He received a BS in 1952 and an MS in 1955, both from Kansas State College. He has been involved with an amazing variety of organizations and has an incredibly diverse list of achievements.

Brown's interest in diver education led him to become a founding member of PADI, a member of the NAUI Advisory Board, and to currently hold positions on PADI's International Advisory Board and Master Instructors Review Board. In addition, Brown served four terms as the

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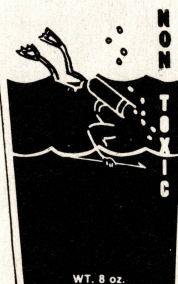
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NOGI AWARDS

president of the Underwater Society of America.

His athletic predilection prompted his supervision of four national scuba championships, two years spent representing diving to the Amateur Athletic Union, and his role as co-developer of the official North American Spearfishing Catch Records System.

Brown says he's enjoyed his assumed career of diver/activist. He is diving's only representative on the National Water Safety Congress, fought against restrictive dive bills in several state legislatures, and has helped draft fair diving laws in two state legislatures. Brown also spearheaded the movement of the North American nations to retain the present divers flag within the World Federation of Diving.

Scientific achievements have not eluded Jim Brown either. He led the group that dived and sonar mapped the world's largest flooded open pit mine. The mine is now under official consideration as an underwater historical park. His scientific accomplishments brought him the Midwest Diving Council's Diver of the Year Award for Science in 1969.

Though Brown resides in land-locked Missouri, his penchant is for underwater photography. This proclivity resulted in the Midwest Council's accreditation for making the first Central U.S. underwater movie. The movie was entitled: *Basic Scuba Training*, and was released in 1962.

ROGER COOK—SCIENCE

Roger Cook began his subaqueous career in 1961 as a member of the U.S. Navy Underwater Demolition Team. He continued his military career as a range diver in the Marshall Islands until 1966, whereupon he became Chief Pilot for the *Deep Diver*, a diver lock-out submersible vehicle. Depth rated to 1350 feet, the *Deep Diver* cooperated with the U.S. Navy under a search & recovery contract. The record lock-out dive of 700 feet was performed by Cook from the Perry-Link *Deep Diver* in 1968.

A Florida diver, Cook joined Harbor Branch Foundation, Inc., a non-profit corporation established for marine research and for the development of tools and systems for underwater oceanographic research in January of 1974.

As Operations Director, Cook is responsible for planning and directing the missions of Harbor Branch vessels, submersible support ships, Johnson-Sea-Link I & II and CORD (Cabled Observation and Rescue Device), the unmanned, remote-controlled vehicle.

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entific cruises have been conducted at Harbor Branch — including a 600 foot lock-out dive off the coast of Ft. Pierce, Florida; the second deepest on record from a submersible.

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SCUBAPRO AWARD WINNERS

John Cawsey, Canadian sales representative for Scubapro, has joined the Scubapro Million Dollar Sales Club. He had more than one million dollars in sales for Scubapro during the 1979-80 sales



Mike Brock and John Cawsey

year. In joining this exclusive club, Cawsey received a Million Dollar Award Plaque from Scubapro's national sales manager, Mike Brock.



Dick Bonin and Richard Hernandez

Richard Hernandez, Pacific regional sales representative for Scubapro, received the first annual Top Hat Award for the largest increase in sales volume for a territory during 1979-80. The award was presented at Scubapro's sales meeting by Scubapro president, Dick Bonin.

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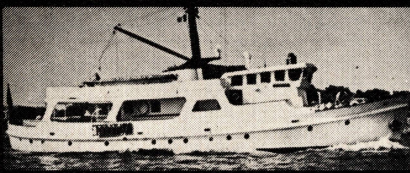
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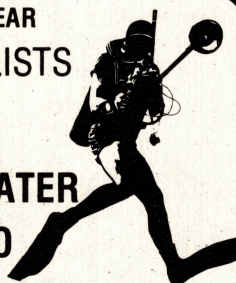
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DIVE MEDICINE SEMINAR

Diving Medicine in Depth, an advanced program for physicians, will be held at the Flamingo Beach Hotel, Bonaire, April 25-May 3. The program is sponsored by Human Underwater Biology, Inc.

Leading authorities from the field of dive medicine will provide in-depth coverage of a broad range of topics. Also included will be case discussions of research activities and the treatment of dive casualties at the USC Marine Science Center on Catalina Island.

By special arrangement with the new underwater photography facilities offered by Dive Bonaire, a limited number of attendees will have the opportunity to extend their visit through May 9 to participate in an underwater photography workshop presented by Rick Frehsee. For information write: Human Underwater Biology, Inc., Dept. #1266, P.O. Box 5893, San Antonio, TX 78201.

OCEAN DIVER

Ocean Divers' boat, the *Ocean Diver*, is nearing the final stages of completion. Bunks for ten — with a large storage area beneath each — freshwater showers, and an area for rinsing camera gear have been installed. Other new additions include an Onan 15kw generator, a Poseidon 7cfm compressor, and a complete complement of electronics — a Furuno radar, a hull single sideband radio, a Motorola VHF, and a Sitex recording fathometer.

The 50 foot marine management hull has a spacious afterdeck for your dive and photo gear. Water entry is easy with the walkthrough transom and a large dive platform. The platform ladders extend several feet beneath the surface of the water to make for an easy boat entry. A Zodiac inflatable is on board for safety, for ferrying divers to shore in the evening, or for water skiing after the day's diving.

The *Ocean Diver* will be available for three to five day charters, May 1st through to September 30th. The *Ocean Diver* will leave its home port for the Western Bahama Islands, the Cay Sal Banks, and along the Florida Keys to the Dry Tortugas and Fort Jefferson. For information write: Ocean Divers Inc., P.O. Box 1113, Key Largo, FL 33037, (305) 451-1113.

FIT GRANT

The National Oceanographic & Atmospheric Administration has awarded Florida Institute of Technology a \$30,000 grant to provide second year support for the Underwater Technology Program. This is a two year curriculum in hardhat commercial diving leading to an Associate of Science Degree. The program is a joint venture between industry, government and the university.

SDM travel

SECTION

One of the most misunderstood dive areas in the Pacific is the magnificent Fiji Islands. This is because the really good diving is a significant distance from the drumbeat of Fiji tourism as designed for the general public.

Fiji's best dive spots are among the very best in the world, particularly for underwater photographers. Yet many divers visiting Fiji fail to reach them precisely because they are off the beaten track and not easy to visit during short stays of two or three days. Flying into Nadi, divers often look for some quick day diving as they would in Grand Cayman or Hawaii. Unfortunately, the remoteness of the good diving makes this approach impractical. The Pacific just isn't like the Caribbean.

If you have at least a week, however, Fiji can reward you with diving to satisfy the most demanding tastes.

See & Sea Travel has designed a two week program to offer divers the finest in Fiji diving. First, you spend a week at Mana Island, where a three tank per day dive program has been developed. The dive sites combine shallow coral areas with vertical walls that drop 100 feet or more and are festooned with an incredible array of marine life.

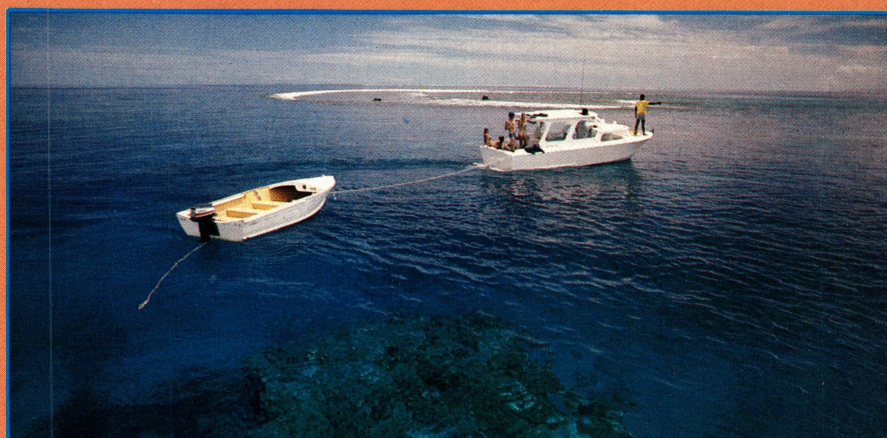
For the serious diver and underwater photographer the reefs are a delight; swarming with soft corals, crinoids, and tropical reef fish. On our last trip, four octopuses gathered together and posed for group portraits: Other encounters with turtles, batfish, nocturnal lobster, and schools of squid and barracuda kept us in a state of high excitement.

During the second week, divers explore fantastic Rainbow Reef. From Taveuni Island, we cross the Somosomo Channel; Rainbow Reef is the sheer wall on the opposite side of the channel near Vanua Levu Island. Three dives per day are offered with lunch right on board the comfortable cabin cruiser.

The currents of the channel at Rainbow Reef have fostered growths of soft

FIJI'S OUTER ISLANDS A Coral Wonderland in the South Seas

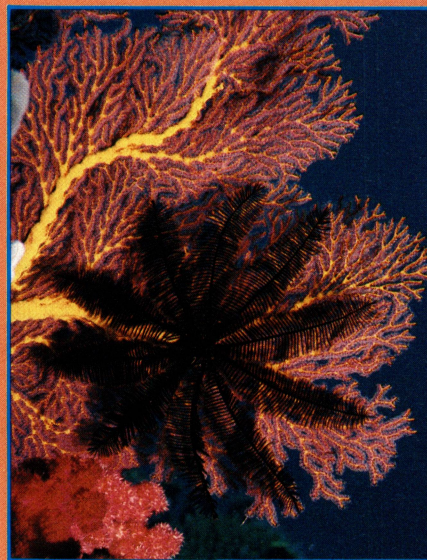
Text and Photography by
Carl Roessler

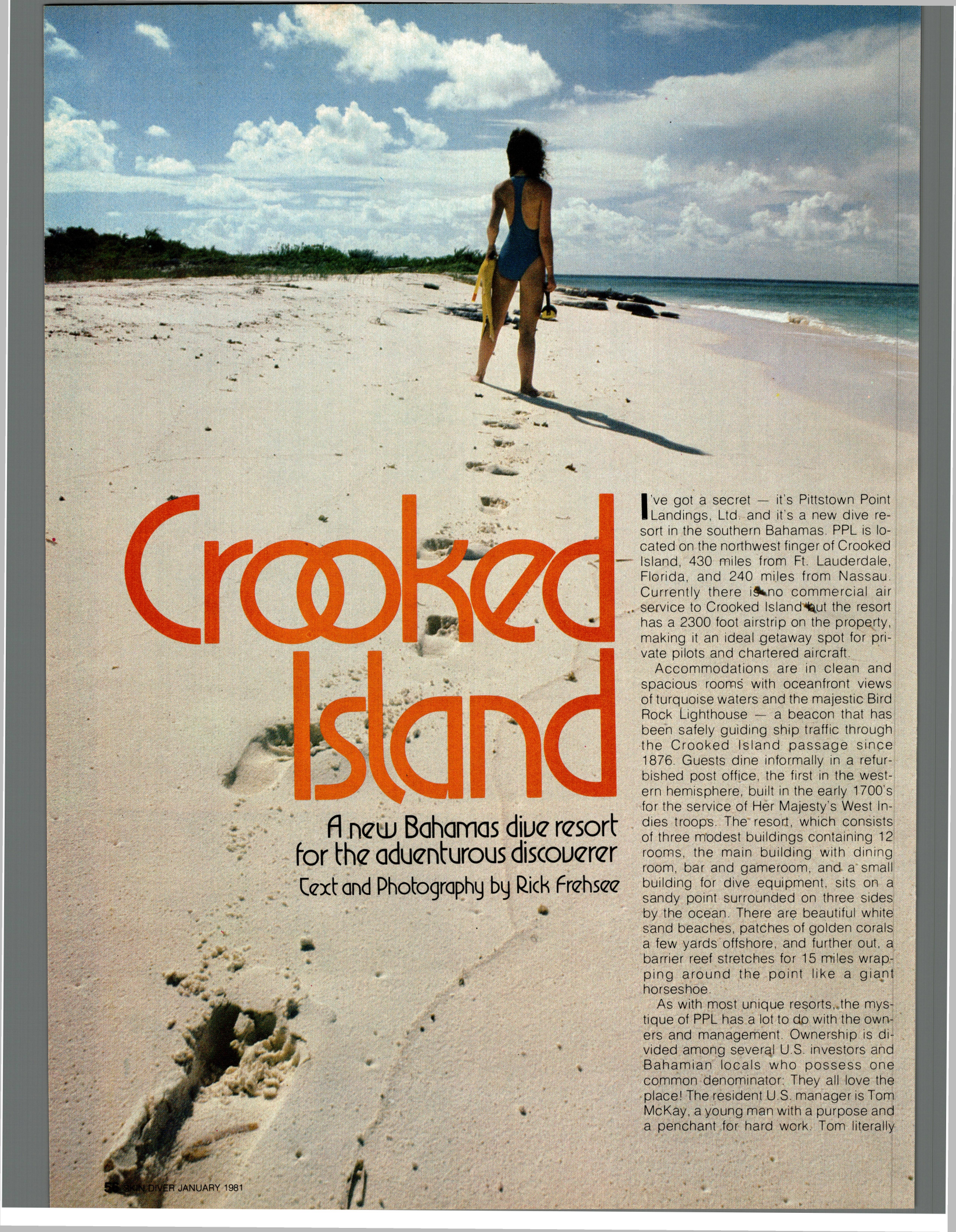


corals that stagger the imagination. These shallow reefs are among the most prolific I've seen anywhere, alive with fish and relatively untouched by divers. At 80 feet you encounter the shallow limit of a remarkable phenomenon — the Great White Wall. This is a field of ice white soft corals carpeting a sheer precipice which drops to 250 feet.

Without question this is world class diving and sensational for underwater photography. The fact that it is many miles from the well established tourist hotels has protected and preserved it for the serious diver.

These outer-island reefs of Fiji are well worth the extra effort and time. This type of outer-island paradise provides great diving for the avid diver willing to go those extra miles. 🐠





Crooked Island

A new Bahamas dive resort
for the adventurous discoverer

Text and Photography by Rick Fréhsee

I've got a secret — it's Pittstown Point Landings, Ltd. and it's a new dive resort in the southern Bahamas. PPL is located on the northwest finger of Crooked Island, 430 miles from Ft. Lauderdale, Florida, and 240 miles from Nassau. Currently there is no commercial air service to Crooked Island but the resort has a 2300 foot airstrip on the property, making it an ideal getaway spot for private pilots and chartered aircraft.

Accommodations are in clean and spacious rooms with oceanfront views of turquoise waters and the majestic Bird Rock Lighthouse — a beacon that has been safely guiding ship traffic through the Crooked Island passage since 1876. Guests dine informally in a refurbished post office, the first in the western hemisphere, built in the early 1700's for the service of Her Majesty's West Indies troops. The resort, which consists of three modest buildings containing 12 rooms, the main building with dining room, bar and gameroom, and a small building for dive equipment, sits on a sandy point surrounded on three sides by the ocean. There are beautiful white sand beaches, patches of golden corals a few yards offshore, and further out, a barrier reef stretches for 15 miles wrapping around the point like a giant horseshoe.

As with most unique resorts, the mystique of PPL has a lot to do with the owners and management. Ownership is divided among several U.S. investors and Bahamian locals who possess one common denominator: They all love the place! The resident U.S. manager is Tom McKay, a young man with a purpose and a penchant for hard work. Tom literally

breezes through 12 hour days and does a multitude of jobs well, including being a superb scuba instructor and divemaster.

To tell what PPL is really like, is to tell what it is not. There are no phones, TV, air conditioners, room service, paved roads (hence no traffic), souvenirs, tourist shops, golf courses, tennis courts, and, not many people. Consider that one of the owners might help you with your luggage, and that you might go diving with the resident manager in the morning, see him out cutting the grass in the afternoon and then catch him in the kitchen helping to prepare dinner in the evening.

Now for a complete picture, consider what they do have. In your mind's eye see peace, tranquility and nature's gift to humankind expressed in sparkling waters, gently swaying pines, and the bluest of skies decorated with the whitest of clouds. Stroll down a beach where there are no footprints but your own and, at night, have your breath taken away by a sky that looks like diamonds on black velvet. Take an evening stroll with a special friend and relearn the art of just talking, or stop and listen to the sound of gentle surf lapping upon a powder beach. Just before you close your eyes to sleep, watch the beam from Bird Rock Lighthouse gently pan the walls of your guest room.

Besides a special peace of mind, PPL also offers some great diving. The resort has a compressor, 20 rental tanks, an aluminum skiff and an inflatable boat. Most of the dive locations are 5 to 15 minutes from the beach. The corals are prolific and healthy, the sponges are abnormally large and colorful, and there is the kind of fish life that has made the Bahamas famous. The visibility frequently exceeds 100 feet.

A dive spot called Thunder Alley offers unusual thrills. Typical of the outside of the reef system here, the corals tumble away like a talus staircase toward deep ocean. Leading to the outer edge are sand channels which divide the huge mountains of corals into crevices, canyons and alleyways. Big grouper and giant stingray travel the channels and quite often majestic spotted eagle rays with their snowy undersides glide by in formation. There are acres of lobular stony corals: brain, star, starlet, lettuce, pillar; and fragile sponges in tube, finger and vase shapes. Gorgeous golden and purple tube sponges protrude vertically and horizontally from calcareous shelves. Equally impressive is the fish life — silvery barracuda, large amberjacks, gayly colored angels, blues and queens, tangs, triggers, grunts and chubs.

Other dive spots include Grandpa Grouper, a monstrous coral head with a vertical drop-off on the outside edge,



Above, the Pittstown Point Landings, Ltd. dive resort is located on the northwest finger of Crooked Island, 430 miles from Ft. Lauderdale, and 240 miles from Nassau. Left, Jeanette Holmes studies a brilliant purple tube sponge. The waters just five minutes off the resort's beach cover acres of corals, multitudes of gorgeous sponges, spectacular vertical drop-offs.

named after a giant 100 plus pound grouper that lives here. Runway 9-3 is on the middle reef, straight out from the landing strip — an excellent alternative from drop-off diving, and a great spot for turtles and fish life. The Bathtub is a large area with sprawling elkhorn and staghorn coral in depths suitable for snorkeling or scuba. Most spots are not named and many which are in reach from the resort have never been explored. The reef fish are so curious that it's possible they have never seen divers before. You'll have to strain your eyes to find a stick of dead coral and it's a safe bet that a beer can is as rare as a golden doubloon.

Diving from the inflatable is simple and four divers have plenty of room. There is no heavy schedule at the resort and a small group can arrange its diving and meals to suit itself, within reason. The dive planning is no-decompression, restricted to 130 feet of depth, and special care should be taken the day you are flying home. There is good snorkeling only 20 yards offshore. Spearfishing or coral collecting is prohibited and boats are not available as yet for night dives.

Daytime diversions other than diving, swimming and sunning include a visit to Landrail Point, the closest settlement to PPL. The townspeople are typically out-island; honest, kind and friendly. They are all Seventh Day Adventists and their hospitality and friendliness are re-

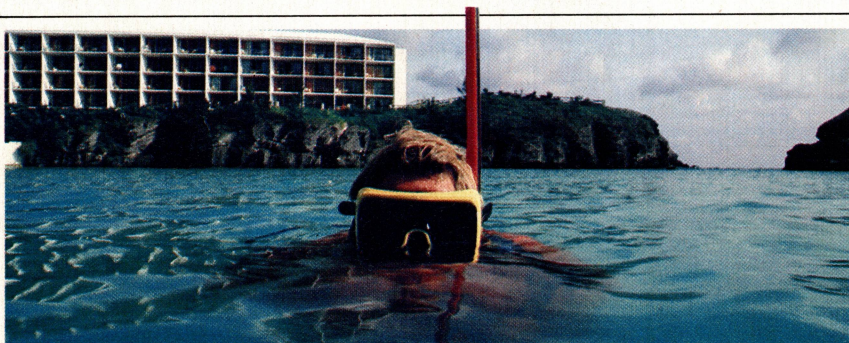
membered by all who visit this quaint community.

Another landmark is Marine Farm, a fort that guarded the precious orchards and gardens of the British in the early 1700's — it can be visited if arrangements are made in advance. After rowing across a shallow salt marsh in a small inflatable and winding one-quarter mile up a scrub covered hill, we came upon the ruins. My eyes could hardly believe the half-buried cannons with markings dating to George V of England.

Rates are very reasonable. Rooms are \$45 single and \$80 double, full American plan. The food is excellent, and features Bahamian/American cuisine. Forty dollars is charged per dive trip, double. Dives are normally at 9:30 am and 2:30 pm. Recommended charters are with Trans Island Airways out of Ft. Lauderdale International Airport. The stateside contact for reservations and information is Trans Mar International, Inc., 1640 S.E. 7th Street, Ft. Lauderdale, FL 33316.

PPL is for the discoverer — the adventuresome diver seeking new, spectacular frontiers; the private pilot in search of an enchanting place to visit; the vacationer who really wants to get away from it all. A visit to what Columbus called the "fragrant island" and what modern travelers are calling the Bahamas sleeper will help you to discover the true adventure of the underwater world. 

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LA MER / RED SEA

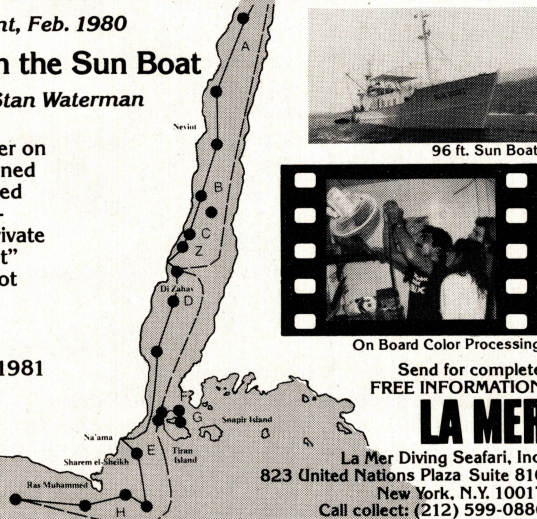
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In order to provide for occasional windy periods, the management has set up a standard policy of: (1) Having a telephone check-in time for the latest possible weather go/no-go decision just prior to your departure, and (2) Allowing everyone to stay aboard the *Reef Rover II* with all food and drink provided for \$24.50/person/day, in the event bad weather forces the boat to remain in port.

Besides Looe Key, many new, uncrowded dive locations, along with four shipwrecks, have been incorporated into the three day (or longer) excursions, including a night in Key West. The boat will run with a group of 15-18 divers for \$64.50/person/day, while a group of 19-24 divers will pay \$59.50, including a free ride for the leader. Non-divers are welcome for \$10 per day less. Alternate packages, with varying dives made, are also available. Write: Capt. Ed Davidson, Hurricane Aqua-Center, Hurricane Resort Motel, 4650 Overseas Highway, Marathon, FL 33050.

TOZER APPOINTMENT

Dick Batchelder, president of Columbus Landings Service Co., announced the addition of Colin Tozer to the staff of certified divemasters operating at Island Divers Ltd., San Salvador, Bahamas. Colin was born in the United Kingdom but spent most of his life in the Bahamas. He formerly lived in Nassau, and has been diving the reefs of New Providence Island since he was 12.

Colin began his career as an underwater guide five years ago and has remained deeply involved in the business ever since. He previously worked as a dive shop technician at Nassau Dive Supply. He received his PADI open water instructor certification in 1979 and is now fully qualified to serve as both a divemaster and scuba instructor. Among his specialties is an extensive experience in first-aid work and technical training in scuba regulator repair. The addition of Colin brings the San Salvador divemaster staff up to five fully certified scuba instructors.

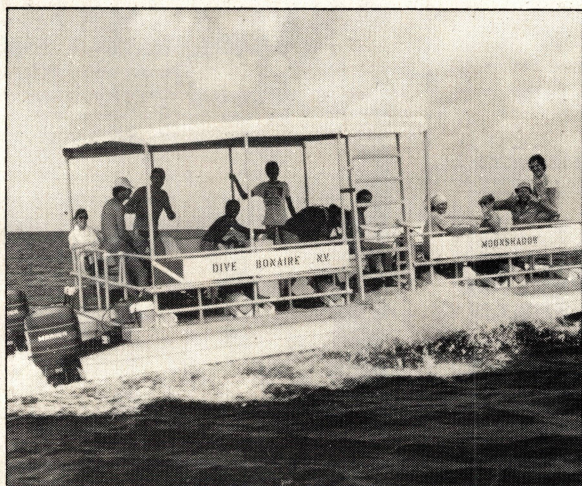
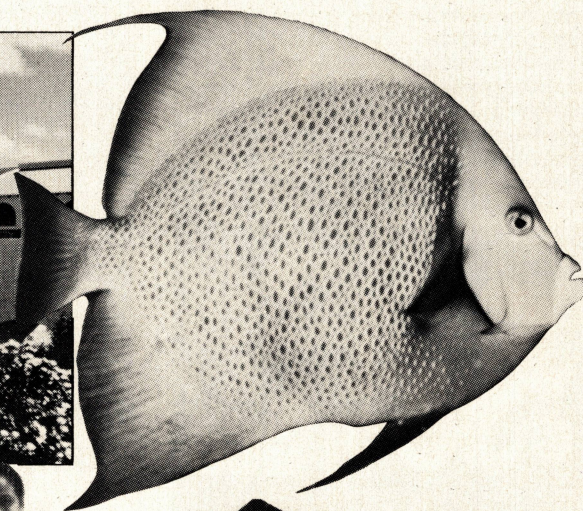
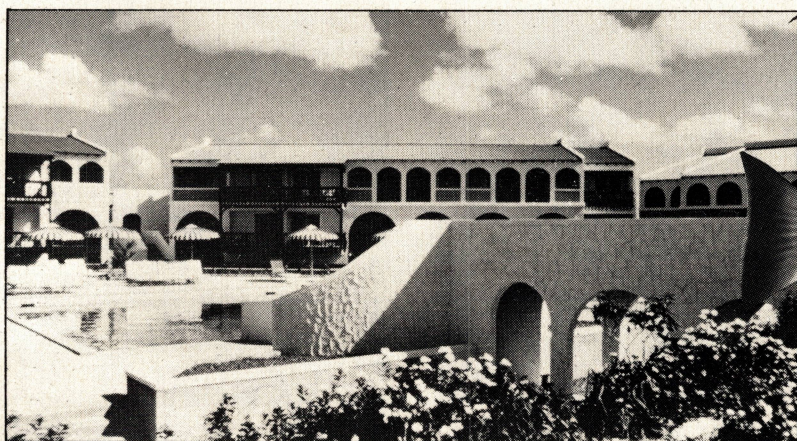
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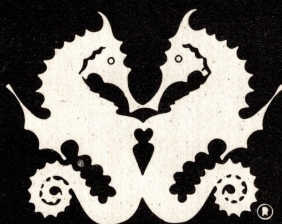
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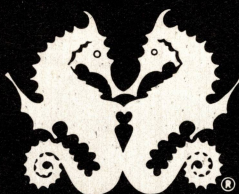
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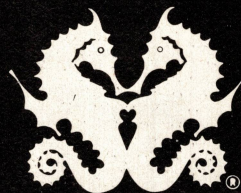
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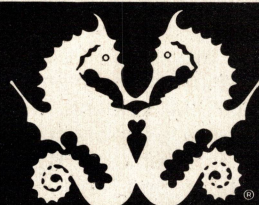
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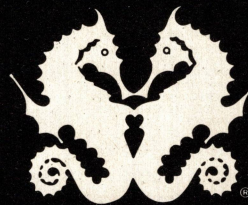
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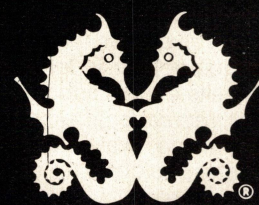
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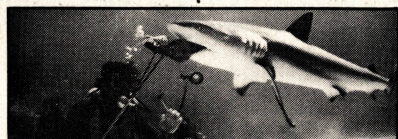
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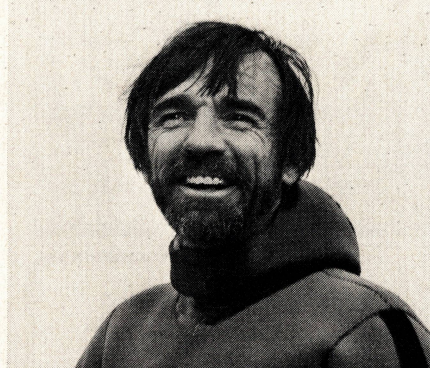
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February 21-28, 1981 will mark the debut of Lou Fead's Skill Sharpening Dive Program, SSDP, on the island of Cayman Brac in the British West Indies. Lou, author of the book, *Easy Diver*, is a nationally



known speaker, inventor and instructor. He will conduct a six day advanced program combining lectures, skill dives and fun dives, concluding with an advanced certification for each participant.

Course content will consist of diving antics, buoyancy control, U/W navigation, buddy assistance, night diving, deep diving, plus a whole lot of just plain fun. The SSDP is limited to 20 participants. For information write Lou Fead, % Sea Safaris, 3701 Highland—Suite 304, Manhattan Beach, CA 90266.

RED SEA

Smokey Roberts of Divers Den, Lancaster, PA will lead a group to the Red Sea, March 15, 1981. Smokey is a noted U/W photographer. The tour will include nine days of diving the fabulous reefs in the Sharem El Shiekh region, including Ras Muhammed. Two days of touring Jerusalem will also be included. For information write: Poseidon Ventures Tours, 359 San Miguel Dr., Newport Beach, CA 92660.

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Bonaire Beach Bungalows, the small bungalow complex on Bonaire, Netherlands Antilles, will be expanded by four two-bedroom units. Located only three miles from downtown, on the water, with one of Bonaire's most beautiful reefs 100 feet from the front porch, the bungalows offer full living/kitchen facilities. Dive facilities are offered by affiliation. Prices range from \$290 per week in the low season, to \$360 per week in the high season. The bungalows accommodate four persons comfortably, with a maximum of eight. For information write: Bonaire Beach Bungalows, P.O. Box 155, Bonaire, Netherlands Antilles.

CIMI/SEA SAFARIS

Nancy Ackerman and Bob French of Sea Safaris, and Karen Straus of the Catalina Island Marine Institute, are announcing their association on a series of educational dive tour programs. CIMI has organized diving and marine biology oriented camps at its Toyon Bay facility for elementary through university level students for the past two years. In addition to Channel Islands environmental studies, Sea Safaris/CIMI students will now have the opportunity to explore such diverse marine environments as Baja California, the Caribbean, and Tahiti with marine biologists and scuba instructor group leaders. For information write: Sea Safaris, 3701 Highland Ave — Suite 304, Manhattan Beach, CA 90266.

SCUBA CAMP POCONO

Scuba Camp Pocono in Reeders, PA, located in the heart of the beautiful Pocono Mountains, offers NAUI scuba certification. The five day course includes pool work and use of deep diving wells, and open water certification in the Delaware Water Gap. The camp has many other activities, including tennis, basketball, canoeing and sailing. Families can earn NAUI certification. The package includes accommodations, meals, scuba lessons and all other sports. For children under 12 years of age, a skin diving certification course is available. All courses are supervised by NAUI instructors. Special family rates are available for three or more persons. The package dates are: August 17, August 22, and August 27. For information write Scuba Camp Pocono, P.O. Box 400, Bala Cynwyd, PA 19004.

SAIL/DIVE PACKAGES

SailAway Yacht Charter Consultants, Inc. has introduced Sail/Dive vacation packages for winter 1981. A 7 night/8 day Sail/Dive vacation package includes a U.S. Coast Guard licensed captain, a cook, private accommodations, three gourmet meals a day, all liquor, and a minimum of two tank dives per day. All yachts are fully equipped with tanks, backpacks, weightbelts and an onboard compressor. Other recreational activities, such as windsurfing, waterskiing, fishing and underwater photography, are available on select yachts.

Prices for a one week Sail/Dive vacation range from \$585 to \$1,000 per person, not including air fare. Individuals or groups of up to 24 can be accommodated. Special packages for dive clubs, retail scuba shops and scuba instructors are available. For a list of SailAway's top ten Virgin Island dive sites and a Sail/Dive vacation recommendation, write: SailAway Yacht Charter Consultants, Inc., 3100 North Lakeshore Drive, Chicago, IL 60657.

RICK FREHSEE PHOTO COURSE

SKIN DIVER contributor, Rick Frehsee, has selected the Flamingo Beach Resort and Dive Bonaire Inc. as hosts for

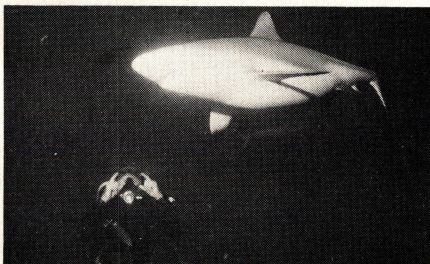


four 1981 underwater photo courses. Modern teaching techniques and on-site evaluations will ensure individual success for a maximum of 15 attendees. The new photo lab, operated by photographer/guide, Dee Scarr, will provide daily color slide processing for progressive evaluation.

The course dates are May 3-10; July 11-18; July 18-25; and September 27-October 4. Write: Dive Bonaire, P.O. Box 686, Ithaca, NY. 🐠

SEE & SEA/VOIGTMANN

Herwarth Voigtman, famed shark tamer of the Maldives, has appointed See & Sea Travel his exclusive U.S.



agent. Voigtman has asked See and Sea to coordinate all individual and group travel to his Indian Ocean dive center. See and Sea has since developed programs and schedules that are now available. Write: See and Sea Travel Service, 680 Beach Street, Suite 340, San Francisco, CA 94109. 🐠

PHILIPPINES

Paul Schutt of Helix, Chicago, will lead another photo dive trip to the Philippines, Feb 21. The 17 day trip will include nine days of unlimited diving in the Sulu Sea, two nights in Manila and four nights in Hong Kong. For information write: Poseidon Ventures Tours, 359 San Miguel Dr., Newport Beach, CA 92660. 🐠

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WHAT'S NEW AT DEMA?

Find out in SDM what the diving industry will be introducing in 1981

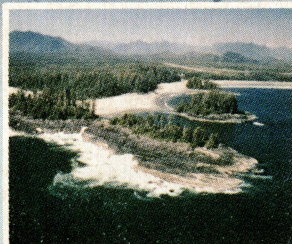
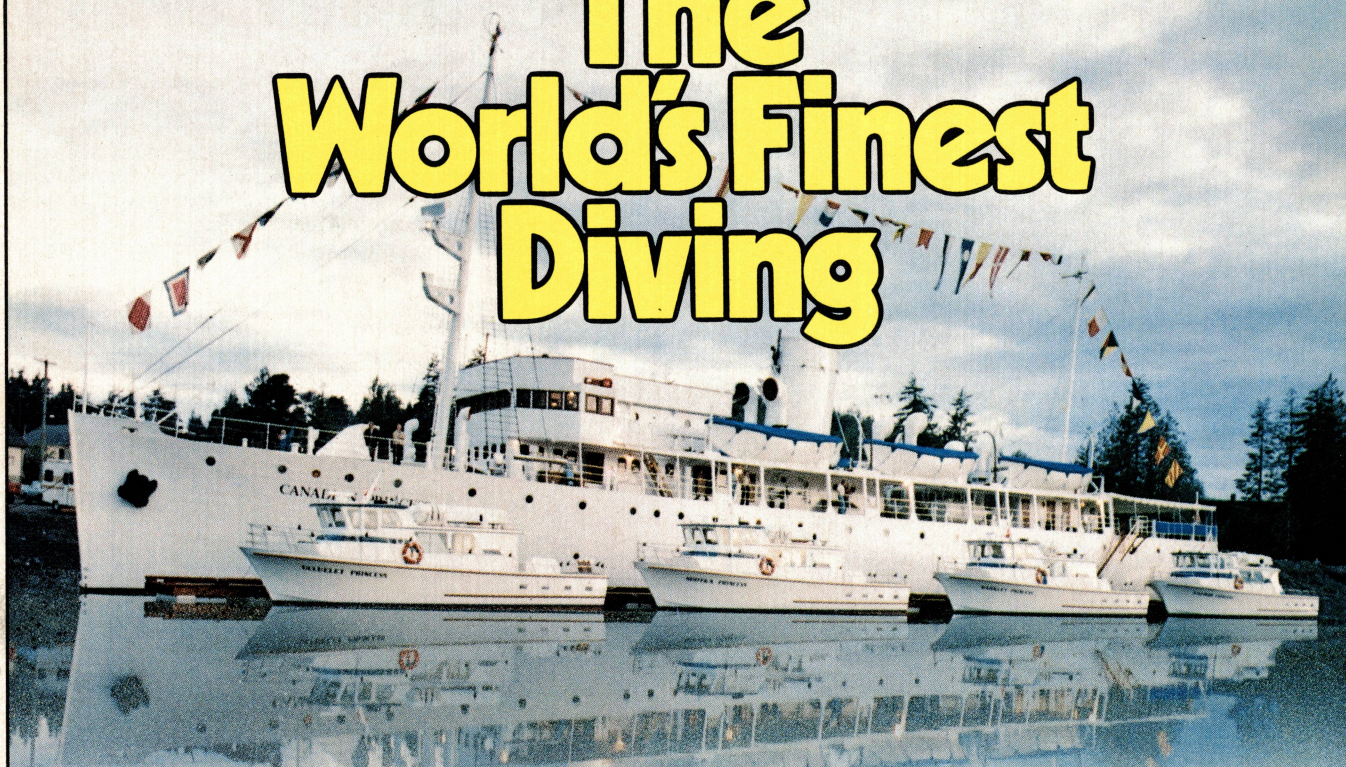
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DEMA

**THE HEART
OF THE
DIVING
INDUSTRY**

A Manufacturer's Association
for the Development and Advancement of the Sport

By Howard Hall

In many industries there comes an annual metamorphosis, a sort of yearly awakening when the various manufacturers interrupt their weekly routines to open their secret doors and bring forth their hopes and dreams; their revolutionary ideas, the product of their strongest efforts, all in the form of shiny new wares. For the sport diving industry that time of year is January, and the cause of all the excitement is the DEMA Show.

The Diving Equipment Manufacturer's Association, or DEMA, was conceived in Chicago, circa 1963. It was a struggling new organization designed to aid a struggling new industry. Eight years later, DEMA is no longer struggling: It has become an extremely active, viable organization. The man responsible for keeping the organization running is its Executive Director, Bob Gray.

DEMA has two main functions: One is to provide performance standards by which sport diving equipment is to be manufactured. As a means to this end, DEMA has a committee, composed of engineers from various DEMA companies, which meets monthly to discuss and set these standards.

The other major function of DEMA is to organize the yearly DEMA Show. At this show (held in Las Vegas this year) all major manufacturers of sport diving equipment display their products and introduce secret innovations they have kept under wraps all year. Hundreds of retailers from around the world will attend the show to select the products they will carry in their stores for the next 12 months.

There are 17 DEMA members. Some of these are the oldest and strongest pioneers in sport diving manufacturing, others are among the youngest in the business. In all cases, they are among the leaders of the industry.

AMF VOIT/SWIMASTER

Of all the companies in the United States that manufacture dive equipment, Voit has been around the longest. Voit began as a retread rubber company at approximately the turn of the century.

After a short time, the company began looking for other ways to use rubber and soon found an additional source of business in the production of beach balls. Almost immediately, Voit became the largest manufacturer of inflatable balls in the United States. Today AMF Voit produces an extremely wide range of sport equipment, from footballs to motorcycles to scuba gear.

when the organization acquired a company called Swimaster. Swimaster was a dive equipment manufacturer with a line of spearguns, masks, snorkels, fins (including the original UDT Duckfoot) and a regulator. From that point on, Voit/Swimaster was a major entity among dive equipment manufacturers. In the mid 50's, Voit/Swimaster equipment was exclusively used and highly publicized by the popular television series, Sea Hunt.

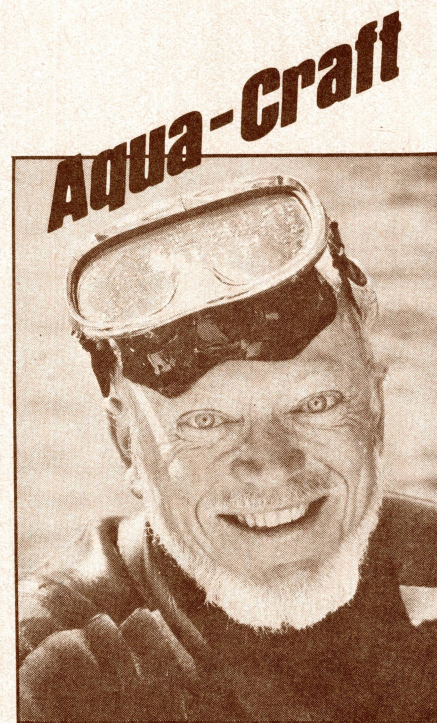
AMF Voit/Swimaster is located in Santa Ana, California, and collectively employs nearly 600 people. Doug Hester has been with the company for five and one-half years and is in charge of the Swimaster division as merchandise manager of Water Sports Equipment. Swimaster has an all-new line of dive masks at this year's DEMA show. In addition, the company is introducing a new fin and a new instrument console.



Doug Hester

AQUA-CRAFT

Aqua-Craft's owner and president, Bill Martin, learned to dive when he was 45 years old, in 1965. He received his NAUI



Bill Martin

Voit was the earliest company to become involved in the manufacture of dive equipment in the United States. It began making masks, fins, and snorkels in the mid 40's, even before the advent of scuba. The fin that Voit produced was to become the forerunner of all fins manufactured today. Designed by Owen Churchill, the Churchill fin was the standard for many years and is still popular today.

Voit became thoroughly involved in the manufacture of dive equipment in 1950

and YMCA certifications in Los Angeles and, along with so many California divers, made his first dives in the spectacular kelp forests surrounding Catalina Island. At that time Martin was an engineering manager in aerospace and as he saw the coming demise of that industry, he began looking for a business to call his own.

Bill Martin recognized the growth potential in the sporting goods business and decided to combine his new sport with his work. In 1966 he formed a company called Aquasonics and began manufacturing an underwater wireless communications system. After two years he sold this company to Hydro Products and became their general manager. In conjunction with the manufacturing of underwater communications, Martin had an opportunity to dive with a wide variety of dive systems, including hardhats and bandmasks.

In 1970 Bill Martin decided to own his own business once again and, as before, he wanted this business to be diving-related. He began looking for a dive equipment manufacturing company to buy, and found Aqua-Craft. That year he purchased Aqua-Craft from its owner and founder, Bob Mitchell.

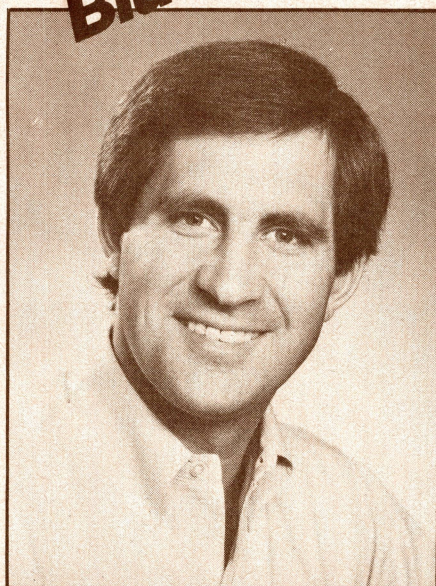
Aqua-Craft is unique among dive equipment companies in that it doesn't manufacture any basic dive equipment. Its production is directed toward divers who have already learned the sport and purchased their basic outfits. Martin recognizes that diving is not a complete sport in itself. Being underwater is certainly a wonderful experience, but unless you have some specific activity to engage in, it becomes difficult to maintain interest over any extended period of time. There are, however, a wide variety of activities within the sport of diving, such as spearfishing, game collecting, underwater photography and fish watching, to name just a few. These are the sports for which Aqua-Craft manufactures equipment. The Aqua-Craft catalog is called the Wishbook and it is hoped that divers can find items within it that will enhance their diving and prolong their participation.

Aqua-Craft's original product was an

abalone iron Bob Mitchell made from surplus stainless steel. Now the company employs 45 people and has an extensive line of products, including the most complete line of game collection equipment available to sport divers. At DEMA this year Aqua-Craft is showing at least a dozen new items — including the new Nikonos IV for which Aqua-Craft has the exclusive distributorship within the sport diving industry. Aqua-Craft is located in San Diego, California.

BLUEWATER WETSUITS

Geoffrey Stern, president of BlueWater Wetsuits, is 31, the youngest DEMA member. While growing up, he was in the ocean off Santa Monica, California con-



Geoff Stern

stantly as a body and board surfer. In 1968 at age 19, Stern became a certified diver. He fell in love with the sport and within three years had acquired a NAUI instructor's rating. Soon he was working for New England Divers as an instructor and was making 200 dives a year.

Stern worked at New England Divers for a short time, then found a job at White Stag. He continued to work for White Stag while attending UCLA and majoring

in business, but when he left college he decided to go into business for himself.

Geoffrey Stern saw a need for color in sport diving. He thought dive equipment should be attractive as well as functional, and he strongly rejected the idea that black was the professional color for sport divers. In addition, Stern felt that the dearth of attractive equipment in the sport contributed to the lack of women's participation. He decided to improve this situation.

In 1977, Geoffrey Stern incorporated BlueWater Wetsuits in Los Angeles, California. His concepts concerning color in sport diving have since proved sound, and after just three years the company is large enough to employ 20 people.

At this year's DEMA Show, BlueWater Wetsuits is showing three new lines of suits. Stern is especially proud of the suit he has named "The Striker." It has color, style and at the same time is highly functional in the water.

DACOR

Sam Davison Jr. became interested in diving while stationed in Guam with the



Sam Davison

Marines in World War II. On the island he found a pair of Japanese goggles and with these he got his first look at a spectacular new environment. Later, in 1948, he got a second glimpse with a facemask while attending the University of Miami. The environment fascinated him and when he discovered in 1950 that a scuba device had been invented in France, he decided he had to have one. Later that year, he and his friends made their first dives in Lake Michigan. There was no instruction available for this new breathing apparatus and this allowed Davison to enjoy dives to 170 feet or more, totally uninhibited by worries of decompression sickness or nitrogen narcosis. He managed to survive anyway.

Sam Davison decided that he wanted to be a manufacturer. He also decided that this new sport of breathing underwater had tremendous growth potential. So, in 1953, Davison started Dacor on his kitchen table by designing and building a double hose regulator he called the "Diving Lung." He created the name, Dacor, by combining the first two letters of his last name and the first three letters of corporation. Later that year his new company outgrew his kitchen table, so he rented a work bench at a Chicago metal stamping company. During Dacor's first year Sam Davison was its only employee.

Today Dacor employs 120 people and manufactures a complete line of dive equipment. The company has several important features that set it apart from most other dive equipment manufacturers. It has its own testing and training pool located right on its Northfield, IL site. This pool is used to test prototype equipment, and to certify new divers. One of Dacor's policies is that all its employees become certified, and this training is provided by the company. In addition to the requirement that Dacor employees be divers, all of the company's key personnel are instructor certified. Davison feels that training and experience as divers provide important insights for all Dacor employees.

Dacor also owns its own boat which is kept in Key West. It is used as a testing facility during the five Caribbean cruises it makes each year.

At this year's DEMA show Dacor is showing several new items and will reintroduce the Pacer Regulator. Davison is very proud of the Pacer. A new design in regulators, it has been out for only two years, but it has become so popular that Dacor cannot fill all its orders. Davison is also proud of the electronic decompression meter. Although the meter is not yet commercially available, the electronics are entirely ready and tested. The unit only awaits the redesigning of the battery that will power it.

FARALLON/OCEANIC

Farallon/Oceanic is unique among dive equipment manufacturers. Although the company produces a wide variety of

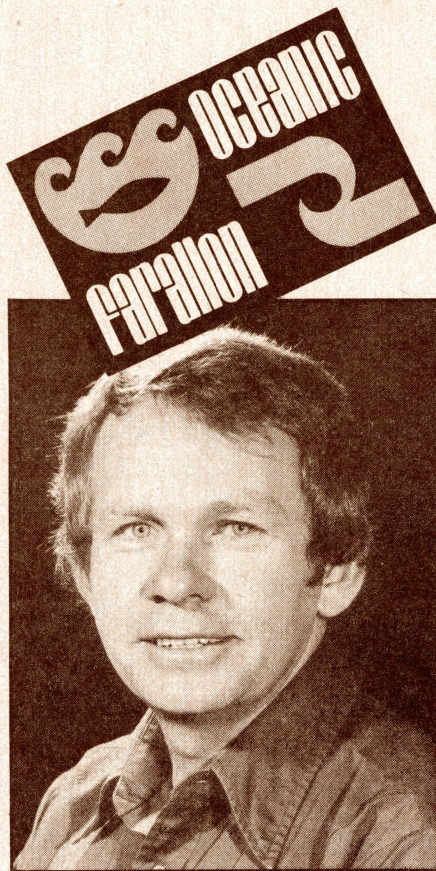
basic dive equipment including masks, fins, gauges, snorkels and diver propulsion vehicles, it is best known for its underwater photographic equipment.

The president of Farallon/Oceanic is Bob Hollis. He started diving off the coast of California in 1954 while he was still in high school. He soon became an avid spearfisherman and abalone diver, and eventually developed a strong interest in shipwrecks. This interest was part of the reason he became involved in the project development and saturation dives on the *Andrea Doria* during the much publicized 1973 treasure salvage attempt.

After graduating from high school, Bob Hollis went to engineering school; then worked for Standard Oil for nine years. It was during this period that he developed his interest in underwater photography and began making plastic housings for his strobes and cameras. When he carried his underwater systems down to his boat in San Francisco Bay, other divers would ask about them and how they might acquire similar systems. Hollis then began making camera housings to sell.

In 1966, Bob Hollis opened a dive shop called the Anchor Shack. Eventually the business branched out into two separate locations. Meanwhile, Hollis continued to build underwater photographic systems in the back room of the dive shop. To increase the sales of this equipment he began advertising in *SKIN DIVER* for mail order business.

Bob Hollis founded Oceanic Products under the parent corporation, American Underwater Products, in 1972. But the company was slow in getting off the ground. Hollis' involvement in the development of the *Andrea Doria* saturation system, and the expedition itself in 1973, kept the company grounded for that entire year. Then, in 1974, a major fire cost the company another 12 months. It wasn't until 1975 with the introduction of the 2001 underwater strobe and the



Bob Hollis

Oceanic underwater hand light that the company was really launched. In 1977 Oceanic Products acquired Farallon Industries and became Farallon/Oceanic. Since 1975 the organization's growth has been extremely rapid.

Today Farallon/Oceanic employs 85 people in the San Leandro, California headquarters. It distributes equipment throughout the United States and most of Europe. The company recently opened a European office in France, called Oceanic Europe, which will handle much of the overseas business. In addition, Farallon/Oceanic has partially financed the development of a new company in France called Pro Rubber. Pro Rubber will be responsible for molding Farallon/Oceanic's rubber products.

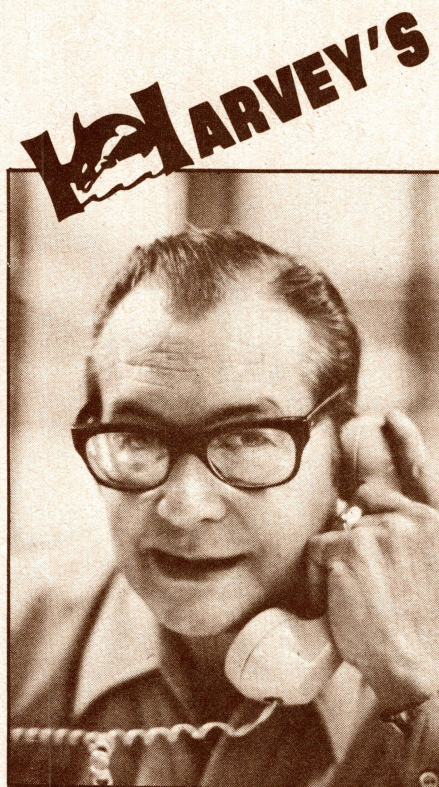
At this year's DEMA show, Farallon/Oceanic is introducing a variety of new products, including a new mask, a Farafin X, and a new line of Nikonos IV accessories. In addition, Hollis hopes to have Farallon/Oceanic's first regulator ready.

HARVEY'S

The owner and chairman of the board of Harvey's is Harvey Grohs. Grohs began diving in Portland, Oregon, before dive instruction was formally available. For him, learning to dive was simply a matter of purchasing the first scuba gear available in the United States and jumping into the water. The year was 1952 and soon he was doing recovery work for the Portland Police Department. Grohs enjoyed diving so much that he decided to move to Seattle and start his own dive store. This he did in 1961 and immediately began to make dive suits for his customers. Six years later the Harvey Suit manufacturing business showed so much more potential than the retail business, that he sold the dive shop.

The dive suit business grew rapidly and soon Grohs was exporting his suits worldwide. Unlike most exporting businesses, Grohs handled all of his sales from behind his desk without using traveling salesmen. For this and other achievements in the exporting business, he was awarded the President's "E" award, presented by the Secretary of Commerce in person, in 1977.

Today, Harvey's is located in Kent, Washington, and employs nearly 100 people. It is a family owned and operated



Harvey Grohs

business, and the company's new president is Grohs' son, Larry. Although dive suits remain a highly important part of the business, the company has branched out into a wide variety of other areas. According to Grohs, "If it has to do with the water, we manufacture it." Harvey's now produces water ski suits and wind surfer suits, in addition to wetsuits and wetsuit accessories. The Harvey's wind surfers are an especially popular item. Grohs feels that the sport of wind surfing may eventually be larger than sport diving.

At this year's DEMA show, Harvey's is introducing a revolutionary new dive boot. Grohs expects it to soon be among his most popular products.

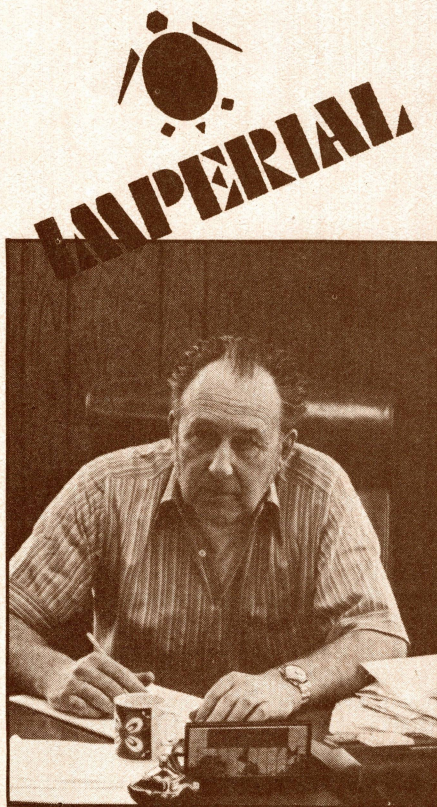
IMPERIAL MANUFACTURING

James Hill is the president and founder of Imperial Manufacturing. He began diving the Pacific Northwest coastal waters by building his own hardhat system. With this contrivance, Hill salvaged small tools from a local Washington shipyard. It was big business — for a recovered hammer he received a nickel and for a saw, a dime.

Hill began scuba diving in 1955. His

first dives were made with a high pressure oxygen cylinder with an oxygen valve as a regulator and pure oxygen as a breathing supply. Soon, however, he made the change to compressed air and became a regular sport diving fanatic.

A source of irritation to James Hill and his friends was the problem of purchasing compressed air for their tanks; on Sundays no air was available. In 1959 he and his friends bought a compressor and began selling air to sport divers. Eventually, this tiny business became Imperial Manufacturing. With the purchase of the air compressor Hill was in the sport diving business and was soon operating his own dive shop. Along with air and



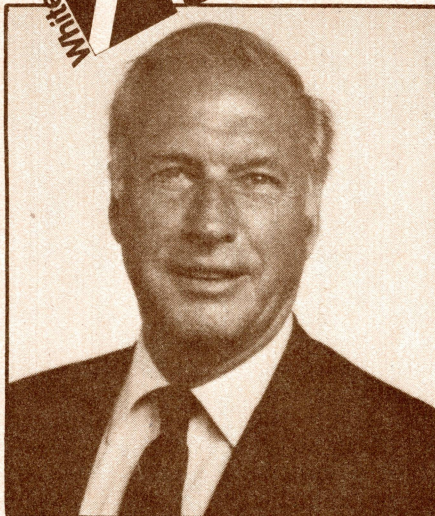
Jim Hill

equipment sales, James Hill began making dive suits. The manufacture of these suits soon evolved into a major part of his business and he began selling them outside his community and, later, outside the State of Washington. In 1973 Imperial Manufacturing had acquired so great a priority over the dive shop business that he decided to sell the retail operation.

Now Imperial Manufacturing employs nearly 150 people and in addition to its line of Imperial wetsuits and drysuits and accessories, it also manufactures gear bags, dive knives, and divers flags.

Of all the equipment that Imperial manufactures, James Hill is most proud of the Imperial Survival Suit. This evolved from sport diving technology and looks like an oversized foam neoprene drysuit. The survival suit is worn by victims of boating accidents. It can be donned quickly and will keep people alive during extended cold water exposures. To date, the Imperial Survival Suit is credited with saving 212 lives.

At this year's DEMA show Imperial is emphasizing color in its dive suit line.



Bob Bludeau

OCEAN DYNAMICS INTERNATIONAL

Ocean Dynamics International is a very new company that represents the merger between White Stag Watersports and Selpac Company. The past president of Selpac Company, and new president of Ocean Dynamics, is Bob Bludeau. Bludeau was one of the original founders of Sherwood/Selpac in Lockport, New York (not to be confused with Selpac Company). He learned to dive in the early 1950's in the Great Lakes area.

In 1968 the Sherwood/Selpac partners sold the company; Bob Bludeau stayed on as the president until 1975. At that time he came out west and purchased one of the Sherwood/Selpac distributors. It is this company that, as of September, 1980, merged with White Stag to become Ocean Dynamics International. The new company will take over the White Stag headquarters in Carson, California and employs about 50 people at present.

Ocean Dynamics International will retain many items of the White Stag line and will also continue to produce its own buoyancy compensators and wetsuits as well as a complete line of scuba equipment.

This year Ocean Dynamics International has more than ten new items at the DEMA show. They are displaying an entire line of new dive suits, masks, gauges, buoyancy compensators and more.

PARKWAY FABRICATORS, INC.

The origins of Parkway Fabricators can be traced as far back as the 1920's. The company was started by the Weiss family in New York and was a men's clothing manufacturer specializing in three piece suits. After World War II, the Weiss family moved its operation to South Amboy, New Jersey, just off the Garden State Parkway. This convenient new location inspired the Weiss family to rename the company Parkway Fabricators. It wasn't until 1956 that Parkway made its first wetsuit, but that was the beginning of a major transition. Five years later the clothing business was abandoned, and Park-

way was in the dive suit business full-time.

Frank Sanger is the president of Parkway Fabricators. He came to the company in January, 1974 after many years of working for New England Divers. N.E.D. and Parkway were then owned by



Frank Sanger

the same parent corporation, and Parkway was in trouble. Sanger was asked by corporate executives to leave his post at New England Divers and take over Parkway. This decision soon produced the cure for Parkway's ills.

Frank Sanger has been a water person most of his life. He was a competitive distance swimmer as a boy. In 1946 he discovered free diving. He began scuba diving in 1951 on the North Shore of Massachusetts, and got a job immediately afterwards working for New England Divers as a commercial diver, salesman and eventually, an instructor. His commercial operations ranged from FAA airplane crash inspection and recovery to Texas oil platform work. A graduate of Northeastern University in Boston, Sang-

er is a trained chemical engineer. But, his vocation and avocation have been diving, and at 47 he continues to log 70 dives per year.

Parkway Fabricators employs approximately 130 people and produces an extensive line of dive suits at the South Amboy headquarters. However, in addition to manufacturing suits, Parkway also distributes the Swedish Poseidon line in the United States. The company is very proud of the Poseidon Unisuit and Jetsuit; proven drysuit designs.

At this year's DEMA show, Parkway is presenting a variety of new products including a backpack system, combination gauges, a new four finger glove, a new Brut Boot and a redesigned Jetsuit; the Jetsuit II. Parkway's featured item at the show, however, will be the new Poseidon Cyclon Maximum regulator. According to Frank Sanger, this world patented, entirely new regulator design will have a noticeable impact on the sport diving industry.

PRINCETON TETONICS

Princeton Tectonics is a relatively new dive equipment company; it has been in business for only five years. The company started out producing only one piece of equipment, but this unit, the Bottom Timer, has had a significant impact on the sport diving market and is now commonplace among sport divers.

The president and owner of the company is Arthur W. Stephens. Stephens has been diving for 15 years, was originally certified by YMCA, and now holds a NAUI instructor's rating. After graduating from college he got a job as a research scientist for RCA in New Jersey. On weekends he enjoyed wreck diving off the New Jersey coast with other RCA em-

ployees. One of these had designed the Bottom Timer and was making them in his basement. Stephens recognized the potential of the device and purchased the manufacturing rights from his friend. When RCA wanted to transfer him to Indianapolis he decided to quit and form

Dick Bonin had; a name and an idea. But it was a million dollar idea.

Dalla Valle and Bonin realized that in order for the sport to grow it would need professional, full-service dive stores that could promote the sport, train divers, and provide dive activities. But, operating a full-service dive store was an expensive proposition, and it was nearly impossible for these businesses to get ahead when the same line of dive gear was being sold in the local department store for less. The department store has none of the overhead created by services such



Bill Stephens

his own business — Princeton Tectonics, based in Highstown, NJ. He had always wanted to be in business for himself and besides, the diving in Indianapolis didn't sound very exciting.

At this year's DEMA show Princeton Tectonics is featuring its new Bottom Light, a relatively small dive light. In addition to the Bottom Light, Princeton Tectonics is now distributing a new Swiss made watch.



Richard Bonin

SCUBAPRO

Scubapro was conceived in 1963 with the expenditure of one dollar. For that grand sum Gustav Dalla Valle became the legal owner of the name Scubapro, and that was about all he and his partner

as instruction, air compressors, and equipment repair. These programs generally operate at a loss for dive stores. In order for the sport to grow, the dive stores needed support from the manufacturer. It was Scubapro's idea to provide this support in the form of a highly professional product line made exclusively available to full-service dive stores. The idea was phenomenally well received by dive stores across the country. In less than ten years, Scubapro was a multi-million dollar business.

Today, Dick Bonin is the president of Scubapro — a division of Under-Sea Industries. Gustav Dalla Valle is now the president of Under Sea Industries. Both men started diving early in the history of the sport; Dalla Valle by snorkeling all over Europe before scuba was available, and Bonin by volunteering for the Underwater Demolition Team in 1953.

Scubapro now has eight branches overseas and employs approximately 500 people worldwide. The majority of these 500 people are divers. After 90 days with the company Scubapro will pay for employee dive instruction. Of Scubapro's engineering and management staffs, 100 percent are divers.

Dick Bonin continues to dive regularly. Scubapro owns a dive boat which makes regular trips to Santa Catalina Island. The boat is used as a testing facility for prototype equipment and as a means for Bonin and his employees to enjoy their sport.

Scubapro's original product line consisted of innovative designs in regulators, but the company is probably best known for the Jet Fin. Scubapro offers an extensive line of tanks, wetsuits, dive equipment including: masks, snorkels, gear bags, gauges, and a decompression meter.

At this year's DEMA show, Scubapro is introducing a new second stage regulator design. The company is also displaying a new weightbelt buckle which will have a great safety significance.

SEAQUEST INC.

Twenty-five years ago, Charles Jehle read an article in an Italian magazine about diving. It fascinated him and when

he saw a set of dive equipment gathering dust in a local sporting goods store window soon after, he decided to give it a try. The equipment came with a simple instruction book. Every evening, Jehle would read a lesson in the book. On the following morning, before work, he would go out to the ocean and practice what he had learned.



Charles Jehle

Three weeks later, a man phoned Charles Jehle and asked him if he was a diver. Jehle didn't know what to say at first, but decided that since he had his own gear and had ventured on his own to 30 feet, perhaps he was a diver. He said, "Yes." The man on the phone said that he might have some work for Jehle and that he would call back if a diver was, indeed, needed. The man called again at 11:30

pm and said, "Yes, they need a diver and need one now." The boat took Jehle out into the ocean off New York City late that night, in very rough seas, to inspect the bottom of a tanker at 90 feet. Everything went wrong on the dive. It was the first time Jehle had dived at night and the first time he had dived below 30 feet. He finished the dive by running out of air below the tanker. But, the inspection report he made was adequate and for the next six years he was a successful commercial diver.

In 1961 Charles Jehle became a salesman for AMF Voit and was soon transferred to the West Coast as product manager. Later, he became merchandising manager of water sports. In 1971, he left Voit to start SeaQuest.

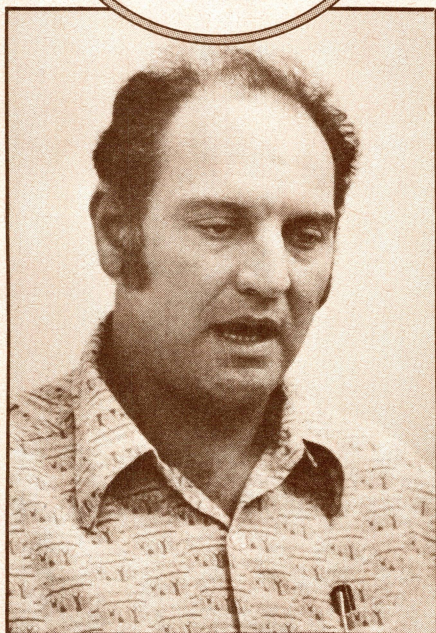
In 1972 Charles Jehle sold SeaQuest to Medalist Industries and, for awhile, the company manufactured and distributed a wide variety of dive equipment. But four years later, Jehle bought the company back from Medalist, and decided to specialize in buoyancy compensators. BC's had been the company's original product line and had always been their specialty, so Jehle decided to stick to what he knew how to do best.

Today the company has 25 employees and produces one of the finest lines of buoyancy compensators available.

SEATEC

The president of Seatec, Harry Ruscigno, has been diving for a long, long time. He began diving in 1946 as a high school student. His uncle introduced him to spearfishing and together they would hunt fish in the cold Northern California waters without benefit of wetsuits. Two years later, Ruscigno was building his own pole spears.

Scuba equipment became available in the United States in 1950 and like the presidents of several other dive equipment companies, Ruscigno managed to get his hands on one of the first available units. He belonged to a club of



Harry Ruscigno

surfers and free divers and when one of the members discovered the availability of scuba equipment, he ordered a dozen complete sets for the other club members and himself. When Harry Ruscigno received his unit he couldn't wait for his friends. He immediately drove down to the ocean, strapped on the equipment, and with no more knowledge than "suck on the mouthpiece for air," he lept off a cliff and into the sea. He still remembers that dive as one of the most beautiful of his experiences.

In 1953 Harry Ruscigno moved to Los Angeles to pursue a college education in aeronautical engineering. That same year he won his first spearfishing trophy. After graduation he moved to San Diego and began working at Convair Corporation. In his spare time he continued to

build spearguns and spearfishing accessories; that is, when he wasn't in the water diving. In 1960 Harry Ruscigno dived in the spearfishing Nationals.

In 1969, Ruscigno started Inflatable Systems, Inc. At that time he recognized that the weakest area in sport diving equipment was the safety vest. He used his knowledge of aerospace technology and came up with the double bag system, with the inner bag electronically heat-sealed. With these innovations, Ruscigno began designing and manufacturing vests and BC's for other dive equipment manufacturers. During the following six years, nearly all major sport diving manufacturers sold vests and compensators made by Inflatable Systems.

In 1975 Ruscigno formed Seatec within the corporate confines of Inflatable Systems. He now makes compensators under his own company name. His original product was the highly popular TD-1000 buoyancy compensator. Today Seatec is located in Orange, California, and at times employs nearly 130 people.

At this year's DEMA show Seatec is introducing a revolutionary new buoyancy jacket design called the Blue Fin II. Ruscigno is very proud of this unit and believes it will be a significant innovation in the sport diving industry.

SHERWOOD/SELPAC

The history of Sherwood/Selpac Corporation goes back to 1923 when the Aluminum and Brass Company of Lockport, New York, purchased the Sherwood Valve Company of Buffalo. Immediately after the merger, the Sherwood Valve Division began making valves for high pressure, compressed gas cylinders. When scuba came to the United States in the early 1950's, Sherwood already had the tooling and technology to become involved. Soon the company was making valves for use in dive cylinders.

In 1959, the Sherwood Valve Company

was responsible for a major invention that had a tremendous impact on the sport: It developed the first single hose piston regulator. This design was adopted throughout the industry by almost every dive company in the business. Two years later, Sherwood came up with the first sonic alarm regulator which was subsequently marketed by Healthways Company.

Sherwood Valve of Lockport purchased the Selwyn Pacific Company (Selpac) of Los Angeles in 1963. Selpac was also in the business of manufacturing valves and regulators for sale to dive equipment manufacturing companies. After the merger, the entire operation moved to Lockport and officially became Sherwood/Selpac Corp.

In 1969, the Hill Acme Company of Cleveland purchased Sherwood/Selpac



L. Orin Lindquist

and soon afterward set up a country-wide network of distributors for its equipment. The company's number of employees jumped from 100 to 300.

Until 1974, Sherwood/Selpac had sold its regulators and valves to other dive equipment manufacturing companies for distribution. But in that year, the company began marketing its products directly to professional dive stores under the name Sherwood.

The president of the company is L. Orin Lindquist. Lindquist became the general manager of Sherwood/Selpac in 1972. Three years later, he was promoted to president. In addition to his MS in Industrial Administration from Purdue University, he brought to the company a wealth of management experience from Price Waterhouse, Colt Industries and General Electric. Lindquist is a PADI certified diver.

Sherwood/Selpac is introducing an important innovation in regulators at DEMA this year. The Magnum Blizzard has been specially developed for super cold water diving.

SPORTSWAYS

Sportsways Company was one of the pioneers in the manufacturing of sport diving equipment. Sportsways tank valves were the first designed specifically for diving. The company also produced the first submersible pressure gauge, the Sea-View. Sportsways also produced a full line of gear including many rubber products. These were molded by a company called Pittman Rubber. Pittman Rubber was founded in 1946 and has been molding fins since 1950. In 1968, Pittman purchased Sportsways and made it a division within the rubber company. This dual organization employs 65 people (about 15 of whom are directly involved in Sportsways) and is located in Huntington Park, California.



Paul Chesney

The founder and past president of Pittman Rubber was Tom Chesney. Tom died last May, and his son, Paul, stepped in to run the business, becoming president of Pittman and Sportsways. He has been with the organization 33 years.

Sportsways manufactures a nearly complete line of sport diving equipment including regulators, gauges, BC's, tanks, masks, fins and snorkels. At the DEMA show this year the company is presenting its current, though upgraded, line of products, including a new depth/pressure gauge.

U.S. DIVERS CO.

U.S. Divers Company was started by Jacques Cousteau. He co-invented the scuba regulator with Emile Gagnan while in the French Navy. After the war, a

French company set up an operation in Canada to manufacture the regulator and in 1949 a friend of Cousteau's, Rene Bussoz, took 12 units to the United States to sell through his sporting goods business. Two years later, Rene had sold six of the scuba outfits and reported back to Cousteau that the United States market was saturated.

In 1953 Jacques Cousteau published the best seller: *The Silent World* and interest in diving exploded. Rene Bussoz reorganized his sporting goods company around scuba equipment and named it



John Cronin

U.S. Divers. That year he sold nearly 1000 dive units.

Today U.S. Divers is located in Santa Ana, California and employs 880 people. Sport diving equipment is manufactured by Aqua-Lung, one of seven major divisions of U.S. Divers Company. Jacques Cousteau still remains chairman of the Board of Directors.

John Cronin is the president of U.S. Divers. In 1954, he was the manager of a retail sporting goods store in New York. He became interested in diving one day when a customer came in and wanted to buy an Aqua-Lung. Cronin didn't have one to sell the man, but said he would see what he could do. He discovered the underwater breathing device was being distributed by a company called U.S. Divers, so he ordered one and sold it to his customer. Soon after, another man came in looking for scuba equipment.

The idea of scuba diving sounded interesting to Cronin and when he discovered that an ex-UDT diver was teaching classes in Albany, he decided to try it. Soon he was scuba diving in Lake George, where he found artifacts from the French and Indian, and even from the Revolutionary Wars. Not long after, Cronin was exploring the shipwrecks of the North Atlantic.

In 1956, while still working for the sporting goods store, John Cronin began teaching diving and later that year his organization became a wholesale distributor for U.S. Divers. Twelve months later, he was the second largest wholesale distributor U.S. Divers had.

John Cronin went to work for U.S. Divers in 1959. He was offered a position in promotion and instruction at a New York City facility owned by U.S. Divers called the Aqua-Lung Institute, where scuba diving was taught. In 1961, Cronin moved to Chicago and became the Midwest sales representative for the company. Six years later, he became the first salesman in the history of the business to sell more than one million dollars worth of scuba equipment. He became president of U.S. Divers in 1972.

Along with Ralph Erickson, Cronin started the Professional Association of Diving Instructors, a non-profit organization, in 1967.

At this year's DEMA Show U.S. Divers has a variety of new equipment to introduce, including a new line of custom wetsuits featuring new styles and colors and a new line of pressure gauges. Their featured item, however, is the new Aqua-Lung Pro Drysuit.

WENOKA CUTLERY

When Joe Zel started his company in 1962 he wanted to give it an American Indian name. His product line of hunting knives, fishing knives, and pocket knives would seem to be best identified with an Indian tribe, so he asked his patent attorneys to find a suitable tribe to name his business after. Although all the popular names had been taken for some use in the sporting goods market, his attorneys did find a little-known tribe whose background seemed to reflect the image he was looking for. The tribe was the Wenoka, and they were known for their craftsmanship.

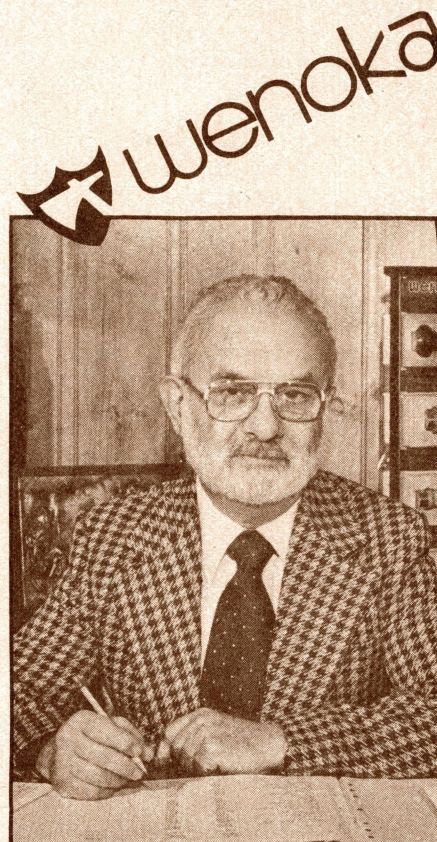
Although the original Wenoka product line mostly consisted of hunting and fishing knives, there was a dive knife right from the start. Zel's interest in the dive knife market increased as his research showed a lack of good knives available to sport divers. He was also encouraged by the great diversity of uses that divers had for various designs of knives. The possibilities for innovation were challenging.

Today, most of Wenoka's business comes from an extensive line (40) of dive knives. These are manufactured in Japan and distributed worldwide. Wenoka, a division of Shur, Inc., has executive offices in Natick, MA and employs 16 people there. A new operations and distribution plant is located in West Palm Beach, Florida.

Joe Zel, president of Wenoka Cutlery, was born in Jerusalem in 1914 and emigrated with his family to Cleveland, Ohio, when he was nine years old. He received his formal education in Cleveland.

At the age of 33 he was part of a team that managed a rapidly growing major corporation in the graphic arts business.

In the next 15 years he was president and chief executive officer in a number of corporations including a major publicly owned corporation.



Joe Zel

In the early 70's he joined his wife, Dorothy, in the management of Wenoka Cutlery. Since then he has devoted his full time to the development and growth of Wenoka Cutlery and its line of dive knives.

At this year's DEMA Show, Wenoka is introducing five new knives. In addition, Zel has a revolutionary new design in divers' knives that he feels will soon become his most popular product. 

The purpose of this article is to give you a performance-oriented report on the Nikonos IV-A. We will use a hands on approach to tell you how to use this new camera, what it does best and what it does worst.

THE GRIP

The "anatomical grip" refers to the shape of the camera body that you hold with your right hand. Your first finger falls naturally over the shutter release button, and your thumb extends up under the film advance lever. If you hold the camera with both hands, the anatomical grip is comfortable to use in either the vertical or horizontal format.

Underwater photographers, however, often hold the camera — and operate the film advance and shutter release controls — with the right hand only. The left hand usually holds a strobe or braces oneself on the bottom. Although a one hand operation is much easier underwater, where the camera is lighter than in air, a one handed operation with the IV-A isn't as smooth as with the Nikonos II or III. With these, you could press an accessory optical viewfinder flush against your mask, and advance the film and trigger the shutter repeatedly without taking your eye off the image in the viewfinder. With the IV-A, you must advance the film with two or three partial strokes of the film advance lever if you keep your eye to the viewfinder. The partial strokes take more time, and the camera wobbles.

If you are doing extension tube work with skitterish subjects, and don't want the framer to wobble and frighten your subject, you'll find it harder to hold the IV-A steady when advancing film with a right hand only grip.

With the anatomical grip, the chance of accidentally changing the shutter speed dial setting during use is eliminated. With the Nikonos III, some photographers would accidentally change the shutter speed setting while advancing the film. And, because a single film advance/shutter release lever must no longer do two jobs, we would expect to see fewer breakdowns in this area.

THE VIEWFINDER

The enlarged, built-in viewfinder has a rectangular rear viewing port which is superior to the small, circular rear ports of earlier models. Its high eye point allows viewfinding with the eye about 1.6 inches (40mm) away from the viewfinder. Thus, the viewfinder is functional when you are wearing your mask. The viewfinder has frame field lines for the 35mm lens focused at infinity, and has parallax correction marks for minimum focus of 2.75 feet.

There are two red LED lights in the bottom of the viewfinder. One is for the built-in automatic exposure control; the other is the ready light of the Nikonos SB-101 Speedlight (strobe). By noting the relative position of either light, you can align

your eye at the correct angle to the viewfinder.

After using the built-in viewfinder both topside and underwater, we noticed that our pictures showed a greater picture area than we remembered. Later, when we double-checked Nikon's specifications, we discovered that the frame field lines show only about 85 percent of actual field of view. This difference, we believe, is a hindrance to good composition.

Because images appear sharply in the viewfinder, and we were engrossed with the LED display, we frequently forgot to change the focus when we changed subjects during our first few rolls of film. This isn't a fault of the camera; rather, it shows that habit patterns must be changed if you are accustomed to using an SLR camera topside.

ACCESSORY VIEWFINDERS

Five accessory viewfinders are available from Nikon. These attach to the shoe on top of any model Nikonos. The optical viewfinders for the 15mm and 80mm lenses, the rubber frame finder for the 28mm lens, and the plastic frame for either the 35mm or 80mm lenses are vir-

tually unchanged. However, a new optical viewfinder for the 28mm lens (which has an attachable mask for the 35mm lens) has been added. It is optically corrected for underwater use only, is parallax corrected so the lines of sight of the viewfinder and lens intersect at about six feet (2m), and has close-up parallax compensation marks for the minimum focused distance of two feet. The field of view shown in the 28mm optical viewfinder is about 90 percent of the actual picture area.

The optical viewfinder is easy to use underwater. Jim usually presses the rear of the finder directly against the faceplate of his mask. But with this or any other accessory viewfinder, you must shift your eye down to the built-in viewfinder to see the LED light displays.

FILM LOADING

The back of the IV-A opens in the same manner as conventional 35mm cameras, and the lens doesn't have to be removed to open it. However, one small point could confuse old-time Nikonos users: The film winds around the take-up spool in a clockwise direction — opposite of all previous Nikonos cameras.



If reloading on a table top, we remove the lens and lay the camera body face down. This prevents the weight of the opened back from tipping the camera body over. If you are wet, and are reloading in a sitting position, leave the lens in place and lay the camera body face down between your knees. Dry your face and hair with a towel, and don't lean forward while reloading or water droplets could fall into the open camera. The hinged pressure plate is spring-loaded to remain closed — which helps protect the delicate shutter curtains from water drops — but it is best to avoid getting any

REWINDING FILM

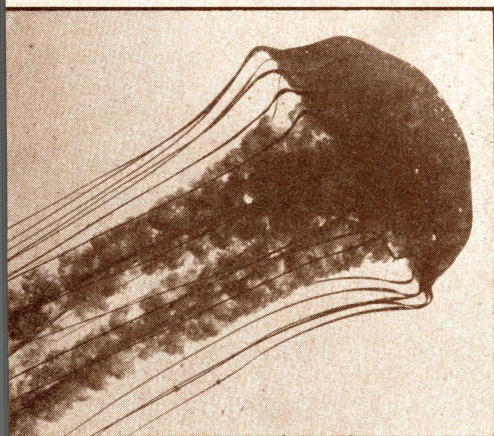
The film rewind lever works the same as those of the earlier models, but the IV-A doesn't have an indicator to show when you have finished rewinding the film. Rather, you must feel the release of tension when the film comes free of the take-up spool. This could be frustrating if you are new to the camera and haven't developed a feel for rewinding. To check if you have finished, simply change the shutter speed setting from R (rewind) to B (bulb), and then *gently* attempt to continue rewinding. If you feel any increased resistance — the rewind lever should jam

NIKONOS IV-A

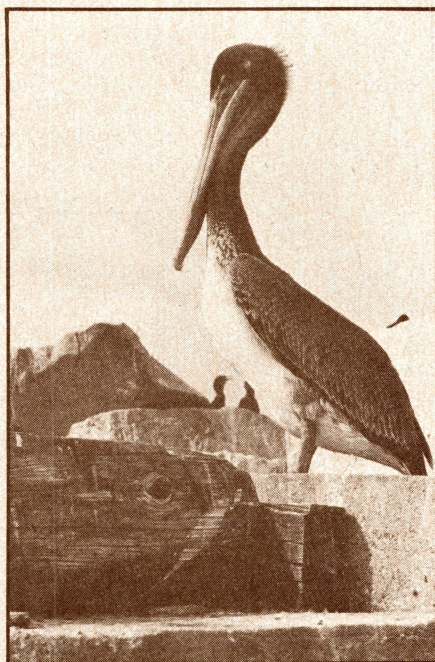
OPEN WATER TEST

Finally, an easy to use 35mm camera for the beginning underwater photographer

Text and photography by Jim and Cathy Church



Left, the Nikonos IV-A with optical viewfinder accessory for 28mm lens. Above, this shot was an upward angle sunlight exposure taken on Kodak Plus-X with the IV-A on automatic, 28mm lens, in turbid water. When a large area of bright sky is in the background, more exposure will be needed than any exposure meter indicates. Increase exposure by changing the film speed from 400 (for Kodak Tri-X) to 200 for the pelican portrait.



sea water inside the camera body. The IV-A is definitely safer and easier to reload aboard an open boat, but you still must avoid salt spray.

The built-in automatic exposure system doesn't turn on until the film has been advanced to the "1" position on the film counter. So, don't panic if the red LED light doesn't turn on — you simply need to advance the film. The film counter numbers are much smaller than those of the Nikonos III. It shows only the even numbers, with small dots for the odd numbers. Old eyes will find the counter difficult to read.

in position — the film is still attached to the take-up spool. Turn the dial back to R and continue rewinding. Make sure, however, that the lever has been raised to the up position. Otherwise, it will revolve freely without moving the film.

THE EXPOSURE CONTROL

The IV-A camera body has a built-in, aperture-preferred exposure control. The light passing through the lens strikes a metering reflector on the front shutter curtain. The reflector directs the light upward to a silicon photo diode (SPD) metering system which is inside the camera

body, just below the viewfinder. You preset the film speed and aperture controls of the IV-A, and the automatic exposure control selects the shutter speed.

This automatic control can be used with the Nikonos 35mm and 28mm lenses, but can't be used with the Nikon 15mm. The protruding rear of the 15mm lens blocks the light path between the internal reflector and photo cell of the IV-A body. As for non-Nikon wide-angle systems, the automatic control can be used with wide-angle adapters (such as the Novatek 20 and Subawider III) which fit over a standard Nikonos 35mm lens, and with the Sea and Sea 20mm wide-angle lens. It can't be used with the Sea-Eye 21mm lens because of its protruding rear lens mount.

To use the automatic exposure control, set the shutter speed dial to A (automatic). When you depress the shutter release halfway, a red LED light will appear in the viewfinder. If the light is glowing, the shutter speed will be somewhere between approximately 1/30 and 1/1000 second. The electronically controlled shutter speed is stepless (infinitely variable) within this range. Continue depressing the shutter release and the shutter will be triggered. The two-step shutter release is easy to use, but doesn't have a click stop for the halfway metering position. Underwater, with cold, numb or gloved fingers, you can accidentally trigger the shutter while attempting to use the meter.

In high light conditions, a blinking LED indicates that the shutter speed has reached the upper limit; and in low light conditions, a blinking LED warns that the shutter speed will be slower than 1/30 second. In this case the IV-A instruction manual advises you to change the aperture setting. And if you cannot stop the LED from blinking by changing the aperture, the subject is too bright or too dim for automatic exposure control.

The exposure control system is powered by two 1.5V batteries located in a battery chamber at the bottom of the camera body. If these batteries should fail, or if you forgot to place batteries in the chamber, the automatic exposure control can't be used. In this case, set the shutter speed dial to the M (mechanical) position. The shutter locks at 1/90 second, and you must estimate the aperture setting.

TESTING METER ACCURACY

Using two IV-A cameras with 35mm and 80mm lenses, we took a series of topside shots with varied lighting conditions. We used Kodachrome 25 because its limited exposure latitude would make any exposure errors obvious. The results showed that the automatic exposure controls of both cameras were accurate for average subjects and conditions. Subsequent underwater tests with Kodak Plus-X and Ektachrome 64 confirmed these results.

APERTURE VS. SHUTTER SPEEDS

It's decision time. The smaller apertures (such as f16 or f22) give more depth of field, but the automatic exposure control may select a shutter speed that is too slow to stop the action. The wider apertures (such as f2.5 or f4) will increase the shutter speeds, but reduce the depth of field so critical in close underwater work. In order to select the optimum aperture for your particular film speed, you need some indication of the shutter speed, and the glowing LED doesn't give you shutter speed read-out.

Here are three methods for estimating the approximate shutter speed the automatic system will select:

1) Topside, on a sunny day, with the sun behind you frontlighting an average subject, the shutter speed selected will be about the same as your film speed when the lens is set for f16. For example, with ASA/ISO 64, the shutter speed will be close to 1/64 second. And if you open the aperture to f11, the shutter speed changes to about 1/125 second.

2) For other topside conditions — such as cloudy, bright, overcast or open shade — check the instruction sheet packaged with the film. By using the apertures the instructions suggest for the foregoing conditions, the shutter speeds selected by the automatic control should be reasonably close to those specified on the instruction sheet.

3) Either topside or underwater, you can program the automatic for an approximate minimum shutter speed, providing that there is enough sunlight for the exposure. Slowly close the aperture until the LED blinks. Note what aperture setting is closest to the "edge" between the glowing and blinking display. The shutter speed would be about 1/30 second at this point — a speed too slow for most hand-held underwater cameras. Opening the aperture by one stop would increase the shutter speed to about 1/60 second, and opening by two stops would increase it to about 1/125 second. This method can also be used if the LED light blinks because the subject is too bright. The light starts blinking at about 1/1000 second. From this point, each time you close the aperture by one stop, the shutter speed is approximately halved.

The automatic exposure control will help beginners get reasonable sunlight pictures quickly. But for the advanced photographer who wishes to control depth of field and picture sharpness, overriding the automatic may be more work than using a fully manual system.

EXPOSURE COMPENSATION

While the automatic exposure control works well for average subjects and conditions, extremely bright or dark subject areas can cause any meter to give false readings. The exposure control tends to darken large, bright subject areas —

such as snow or beach scenes, large areas of bright sky, or the brilliant ball of sun when you are shooting upward silhouette shots underwater. You must often increase exposure by one or more stops to avoid underexposure. Likewise, the exposure control tends to lighten large, dark background areas, and you must reduce exposure by one or more stops.

With a manual exposure control, and hand-held exposure meter, you would compensate by bracketing your exposures. If the meter read f22 with a bright subject, you could take two exposures — one at f22 and another at f16. But with the aperture-preferred system of the IV-A, you can't bracket by changing the aperture. You bracket by changing the film speed. To increase exposure, reset the film speed dial for a lower number or mark. And to decrease exposure, reset for a higher number or mark. Note: Each of the consecutive ASA/ISO film speeds designated on the dial by numbers are one f stop apart. Each of the consecutive marks (by and between the numbers) are one-third f stop apart. You can change film speed while underwater.

ADDING A STROBE

Any strobe with a Nikonos III connector can be used with the IV-A camera body. With non-Nikon strobes, set the shutter speed dial to M (mechanical). This locks the shutter speed at 1/90 seconds and turns the automatic exposure control off. You set the aperture manually in accordance to your strobe exposure table (or underwater guide number) and readings from an accessory exposure meter. If you set the shutter speed dial for A (auto-

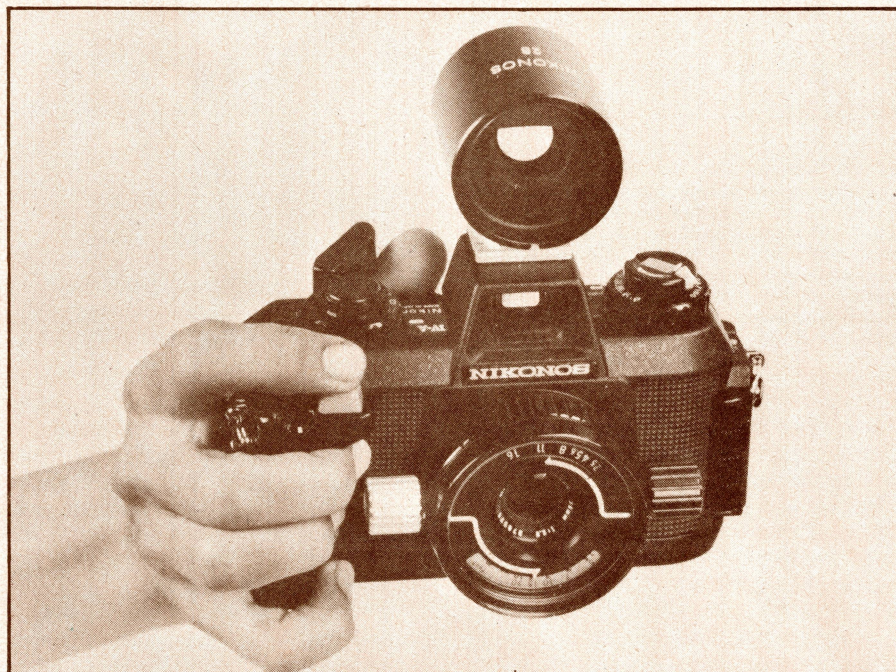
matic), the strobe will flash, but if the automatic exposure control system selects a shutter speed faster than 1/90 second, the shutter won't synchronize with the strobe.

At this writing you will have trouble finding a bracketing system to attach a non-Nikon strobe to the IV-A. But we are sure, however, that several companies are working feverishly to develop bracketing systems for their strobes, exposure meters and other accessories.

The new Nikonos SB-101 Speedlight (strobe) can be used with either the Nikonos IV-A or Nikonos III in either the automatic or manual mode. For automatic operation, a remote sensor is attached to either the accessory viewfinder shoe or to a special bracket beside the camera body. When the strobe has recycled, a lighting bolt shaped LED light glows in the IV-A viewfinder. When the strobe is triggered, the remote sensor measures the strobe light reflecting back from the subject, and the strobe is turned off when enough light reflects back for an exposure. With the Nikonos III, the shutter speed is set for 1/60 second. The strobe will function in the automatic mode, but the III body doesn't have a built-in ready light. You use the ready light on the back of the strobe head.

Please note that the automatic exposure system of the SB-101 Speedlight, and the automatic exposure control built into the IV-A camera body for sunlight exposures, are completely separate systems. And when the SB-101 is used in the manual mode, you must set the aperture manually as with any other non-automatic strobe.

We will follow up with more details



Above, the anatomical grip — the film advance lever is operated with the right thumb, and the shutter release with the right index finger. Opposite page, clockwise from upper left: The film speed dial has a range from ASA/ISO 25 to 1600. The marks between speeds are in one-third stop intervals. The

about the Nikonos SB-101 Speedlight in a subsequent article.

ADDING AN EXPOSURE METER

For sunlight exposures with the Nikon 15mm lens, or any other wide-angle lens that cannot be used with the IV-A automatic exposure control system, a separate exposure meter must be used. An exposure meter mount, such as the Farallon/Oceanic mounts for Sekonic L-86 and Marine meters, can be attached to the 1/4-20 tripod socket at the bottom of the IV-A body. With the 15mm lens, however, the meter mount will have to be modified (with hacksaw and drill) to fit. The baseplate of the Nikonos SB-101 Speedlight has a tapped hole at the bottom which will accommodate a meter mount.

MAINTENANCE

The maintenance procedures mentioned in the IV-A instruction manual can use some elaboration. After rewinding the film, wash the camera body under a tap of flowing water. Work the open-close lock, but don't open the open-close latch. Flush the tight places around the camera controls as you work the controls repeatedly. Don't forget to raise and rotate the film speed dial. If the camera won't be used for several days, soak the assembled camera in a pan or sink of warm water for at least 30 minutes — again, working the controls. Dry with a soft towel and blow as much water as possible from tight places.

Contrary to the instructions, don't insert a pointed object beneath the camera back O-ring to lift it out. We believe that the risk of scratching the O-ring or its

groove is too great. Try using the rounded corner of a plastic certification or credit card. Slide the corner of the card in beside the O-ring, just off-center at the bottom of the camera back. Slip the card under the O-ring and lift it up. This special O-ring has tiny, wing-like projections which fit into slots along the O-ring groove. By using the card off-center, you avoid prying directly on one of these projections. When replacing this rear door O-ring, make sure that it doesn't twist so the projections point up or down. If out of alignment, use the edge of the card to gently press the projection into place. If you have trouble seeing these small projections, use a magnifying glass — it could prevent flooding.

Clean the O-rings by gently pulling them through folds of soft cloth. Don't use too much grease when lubricating the O-rings! A tiny dab of grease — spread evenly over the entire surface of an O-ring — is all it needs. The camera back O-ring needs the thinnest coating because it isn't subjected to friction. The grease doesn't form the watertight seal, it only prevents chafing. Excess grease only holds sand and grit. Before closing the camera back, run a fingertip over the seating surface of the camera body. If any particles are present, you can feel them and wipe them off.

SUGGESTIONS

The enlarged, built-in viewfinder is indeed an improvement, but we believe that it could be improved even more. An even larger viewfinder, designed for the 28mm lens, and which could be masked for the 35mm lens, would be more versatile. A larger viewfinder, of course, would

require a different clamp for the Nikon 15mm viewfinder, but this is a minor mechanical problem. The raised prism at the bottom of the viewfinder (for the LED lights) actually blocks out a portion of the picture area. Thus, you could mistakenly frame the bottom of your picture with the top of this prism. We would rather see a viewfinder without any of the viewing area blocked, and which shows a field of view which more closely approximates the actual picture area.

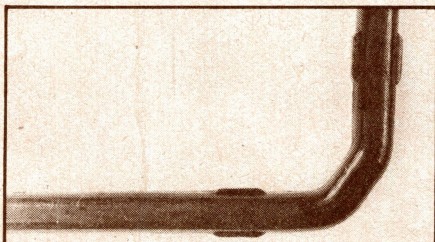
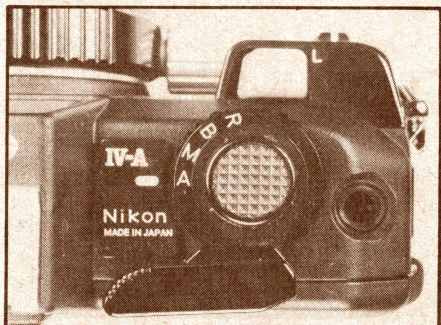
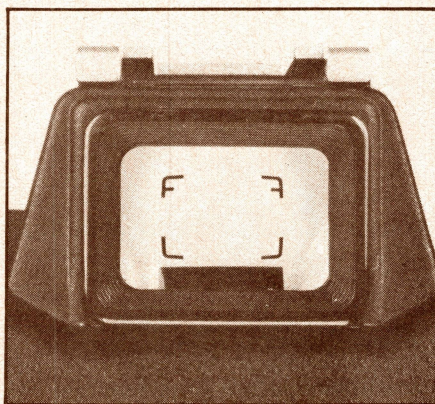
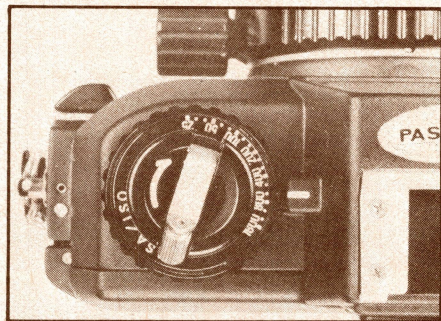
The flash socket is now located at the bottom right side, near the front of the camera. Thus, when the strobe is held at your upper left with the left hand, the cord is more apt to cross in front of the camera lens. And if you run the cord behind the camera, it is more apt to cross between your face and the viewfinder. We would prefer to see the flash socket at the left side — and directed out to the side rather than downward. This would help keep the cord from crossing the lens and would reduce the bending side-stress where it is attached to the Nikonos connector.

What happens if you accidentally flood a IV-A? We can't answer this question at this writing. We have been reasonably successful when repairing flooded Nikonos II and III cameras, but are concerned about the effects of salt water on the IV-A electronics. Our feeling is that it will be more expensive to repair.

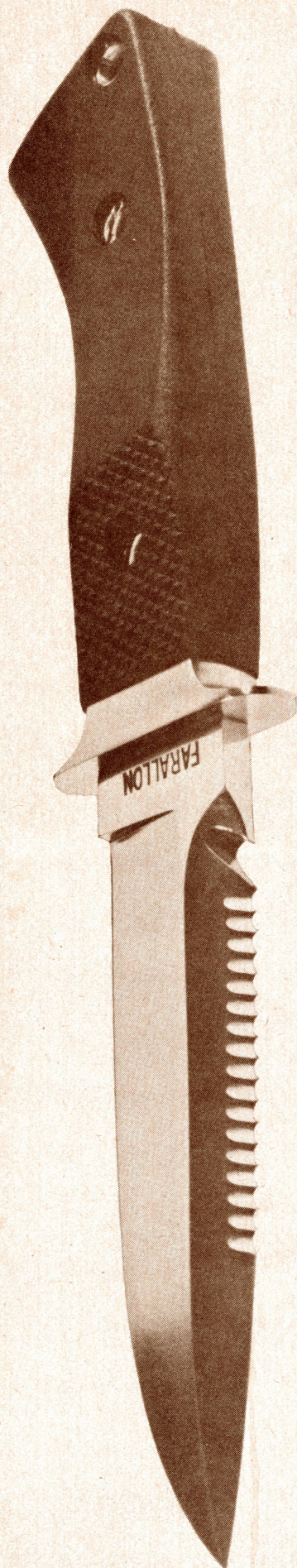
CONCLUSIONS

The Nikonos IV-A was designed with more than the underwater photographer in mind. Rather, it is an all-weather camera for boaters, fishermen, skiers, mountain climbers, backpackers and others who require a camera that will function in a harsh environment. Thus, the IV-A looks and handles more like the conventional 35mm cameras that these topside photographers are accustomed to seeing and using. The addition of automatic exposure control was a necessity. After all, with many less expensive cameras offering such features as SLR focusing, auto-focus, built-in electronic flash as well as automatic exposure controls, how many topside photographers would purchase a \$399 camera body with all manual controls?

For underwater photographers, the most advantageous feature is probably the 1/90 second synchronization with strobes. In situations where sunlight is closely balanced with strobe light, the blurring effects of double images (a short strobe exposure superimposed over the longer sunlight exposure) should be reduced. The built-in exposure control of the IV-A may or may not be an important advantage. If you frequently take sunlight exposures underwater or use the camera topside, it's great. But if you use your Nikonos exclusively for underwater photography with strobe lighting, you're buying electronics you don't need. ➤



enlarged viewfinder — the field frame markings show the parallax correction for minimum focused distance. An enlarged portion of the rear door O-ring has projections which fit into slots in the sides of the O-ring groove. The dial has settings for A (automatic), M (mechanical), B (bulb) and R (rewind).



How do you use your diver's knife?
 "I use mine as a crowbar."
 "I use it to pry scallops off rocks."
 "I use mine as a hammer."
 "I use it to spread peanut butter on my sandwiches between dives."

"I never use it, but it makes me look like a hero when it's strapped to the inside of my calf."

This is a sample of the answers I received when I asked my diving friends about their knives. No one said that the knife was used primarily for cutting. Why? "Everyone knows a diver's knife doesn't hold an edge."

Well, Farallon/Oceanic has come up

The payoff for this extra care is a handsome, sharp-edged knife that easily cuts line or kelp; tasks that required heavy sawing with the traditional diver's tool.

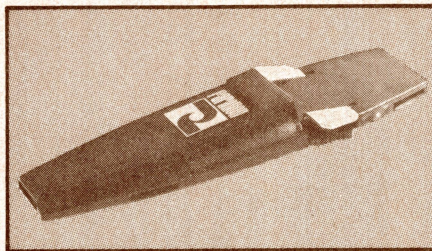
The Talon has a comfortable, full-sized handle of hard neoprene with a textured finger grip. The blade is a compact four and one-half inches long, and is constructed of satin finished stainless steel, with a fine edge and a sharp point. A serrated edge on top of the blade will cut fibrous materials, and a notch at the base of the serrations will take care of monofilament line. The notch is angled in such a way that the

THE TALON

A sharp little dive knife with a revolutionary scabbard
 Text and Photography by Eric Hanauer

with one that does: The Talon Knife. It is not intended to be used as an abalone iron or a crowbar, but as a true underwater knife, perhaps the first of its kind. The blade is made of SUS-3A stainless steel, a material whose high carbon content makes it hard, allowing for sharpening and holding an edge. Ordinary dive knives are made of a softer grade of steel with high rust-resistant qualities, thus sacrificing sharpness.

The price you pay for extra sharpness



is increased susceptibility to surface rust. This may not look good, but it will not pit the steel. The manufacturer recommends washing the Talon in fresh water after a dive, drying it thoroughly, and replacing it in the scabbard only after the knife and scabbard are dry. A light coating of silicone spray will provide added protection. If surface rust occurs in spite of your precautions, it can be easily removed with fine mesh steel wool.

cutting motion is away from the diver's body.

Like the knife, the scabbard was engineered to avoid the pitfalls of existing scabbards. Its simple, effective locking device holds the knife securely, yet allows for one handed removal. The lock consists of a pair of spring-loaded stainless steel tabs that can be depressed by the diver's thumb to remove the knife. A safety lock under the left tab secures the locking device to prevent accidental release in the diver's gear bag. It is not necessary while diving, because the spring prevents unintentional release under normal conditions.

The scabbard is shorter than the knife so that it can fit nearly anywhere: on the weightbelt, on the diver's calf, or on the upper arm. It can even be taped to the sheath of a conventional knife. It is made of rigid Cylolac plastic so it doesn't bend (a cause of slippage with other sheaths).

The retaining straps are thick neoprene rubber with sturdy, stainless steel hardware. They are extra long and can be trimmed to fit individual application.

When sharpening is needed, a high quality, fine grit sharpening stone should be used; never a coarse stone or a grinding wheel. The stone should be lubricated with a high grade honing oil.

(Continued on page 115)

U.S. Virgins

st. thomas

st. john st. croix

SKIN DIVER MAGAZINE
SPECIAL SUPPLEMENT



The dive boat is bucking like a bronco in a rodeo as I scramble to collect my cameras and go over the side. We have just dropped anchor eight miles south of St. Thomas harbor at a place called Frenchcap Cay. There is little doubt that we are far out in the open ocean for the profile of St. Thomas is little more than a dim shadow on the horizon. Large ocean swells are coming at us from the southeast and the color of the water is an exciting inky blue.

I have come to St. Thomas in search of the dive spot which offers the clearest water, and Becky Laub (Aqua Action) has led me to Frenchcap. This reef has a reputation for the best visibility and some of the most spectacular diving to be found anywhere in this part of the Caribbean. A few hundred yards off our stern stands a towering stone monolith which marks the spot. It is not an island but rather a single, solitary hulk of a rock which resembles the shape of a French peasant's hat. It is from the rock's un-

usual appearance that Frenchcap derives its name.

As I hit the water, my heart skips a beat. The visibility is absolutely stunning: I can see details of the reef 100 feet below. Judging from the large area of ocean bottom in sharp focus, the visibility must be 175 feet! We are anchored over a small undersea mount called the pinnacle. Shaped much like a rolling hill, it rises from a depth of 130 feet with gradually sloping sides. In the center is a sharply defined rocky pinnacle which comes to within 65 feet of the surface. This is the target of our dive.

I drift down to the pinnacle slowly while making mental notes of its shape and specific features. The rock has almost vertical walls on all sides, split right through the middle. The split itself forms a natural stone canyon, perhaps 50 feet long, 30 feet deep and eight feet wide. This is where we will dive. Becky points to the marvelous array of marine life growing along the walls of this un-

usual canyon. It reminds me of a Picasso painting or a marvelous Oriental tapestry with its breathtaking blend of vivid colors. Red, orange, apricot, yellow and copper colored encrusting sponges intermixed with the blue, emerald green, brown, and gray hues of marine life. The tapestry is punctuated with the larger forms of lavender, yellow, and purple tube sponges. It is a kaleidoscope of colors and shapes which are absolutely unique to the Virgin Islands. I regret not having brought a close-up lens, but soon became entranced by other visions.

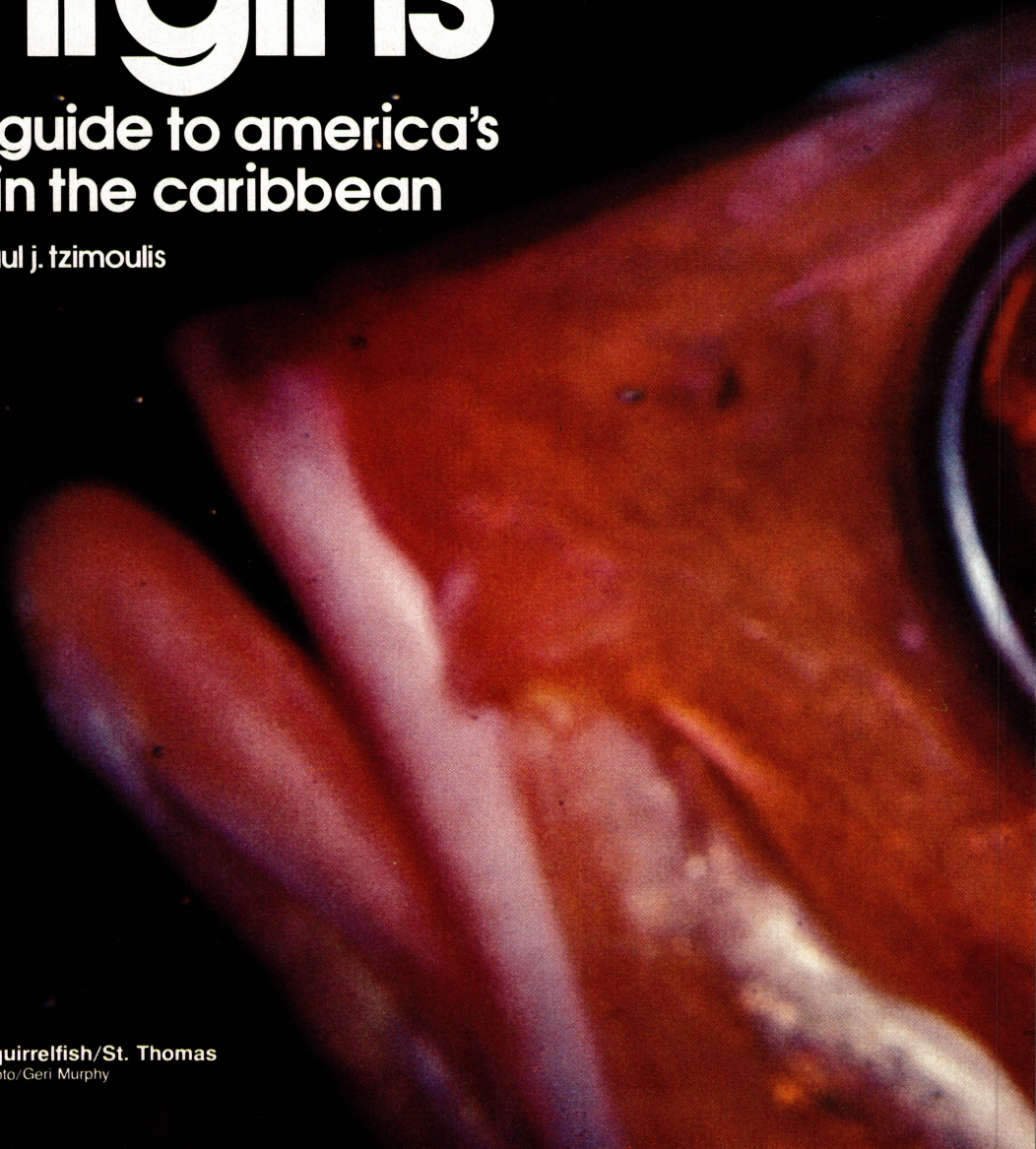
Along the top of the canyon are several outstanding brick red gorgonian fans with their delicate polyps extended and feeding. These elegant octocorals have spreading, fan-shaped branches of horny coral and rows of eight armed polyps that grasp microscopic zooplankton from the sea. Ocean currents bring a continuous supply of fresh food that helps to make these fans healthy

U.S. virgins

an adventure guide to america's
playground in the caribbean

by paul j. tzimoulis

Squirrelfish/St. Thomas
photo/Geri Murphy



and rich in color. Along the outside walls of the rocky pinnacle we discover a veritable forest of these gorgonian fans, serving as mute testimony to the reef's wealth of marine life.

Time seems to fly as I hurriedly shoot photo after photo of this spectacular scene. Frenchcap is as good as any drop-off I have ever dived, with the addition of a unique rock canyon. The range of photo subjects is endless; I find basket sponge after basket sponge, tall, slender seawhips and brilliant tube sponge formations. The reef fish in the area appear friendly and I suspect they may have been hand-fed by dive guides before. Several large yellowtail snapper follow me everywhere, and there is a curious queen angelfish shyly playing peek-a-boo from behind a purple tube sponge.

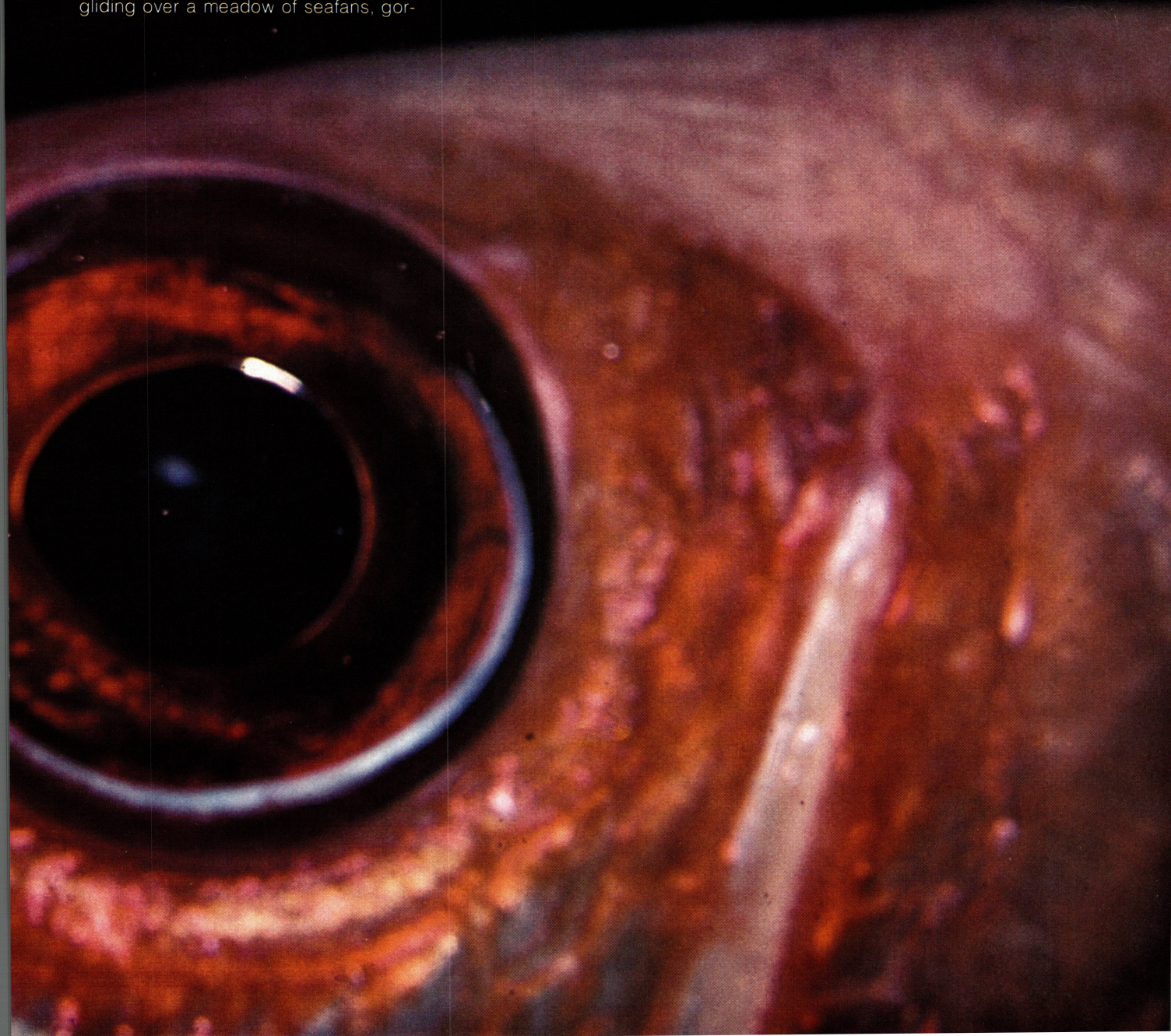
I swim out from the main stone pinnacle, gradually descending the slope of the sea mount to 110 feet. It is like gliding over a meadow of seafans, gor-

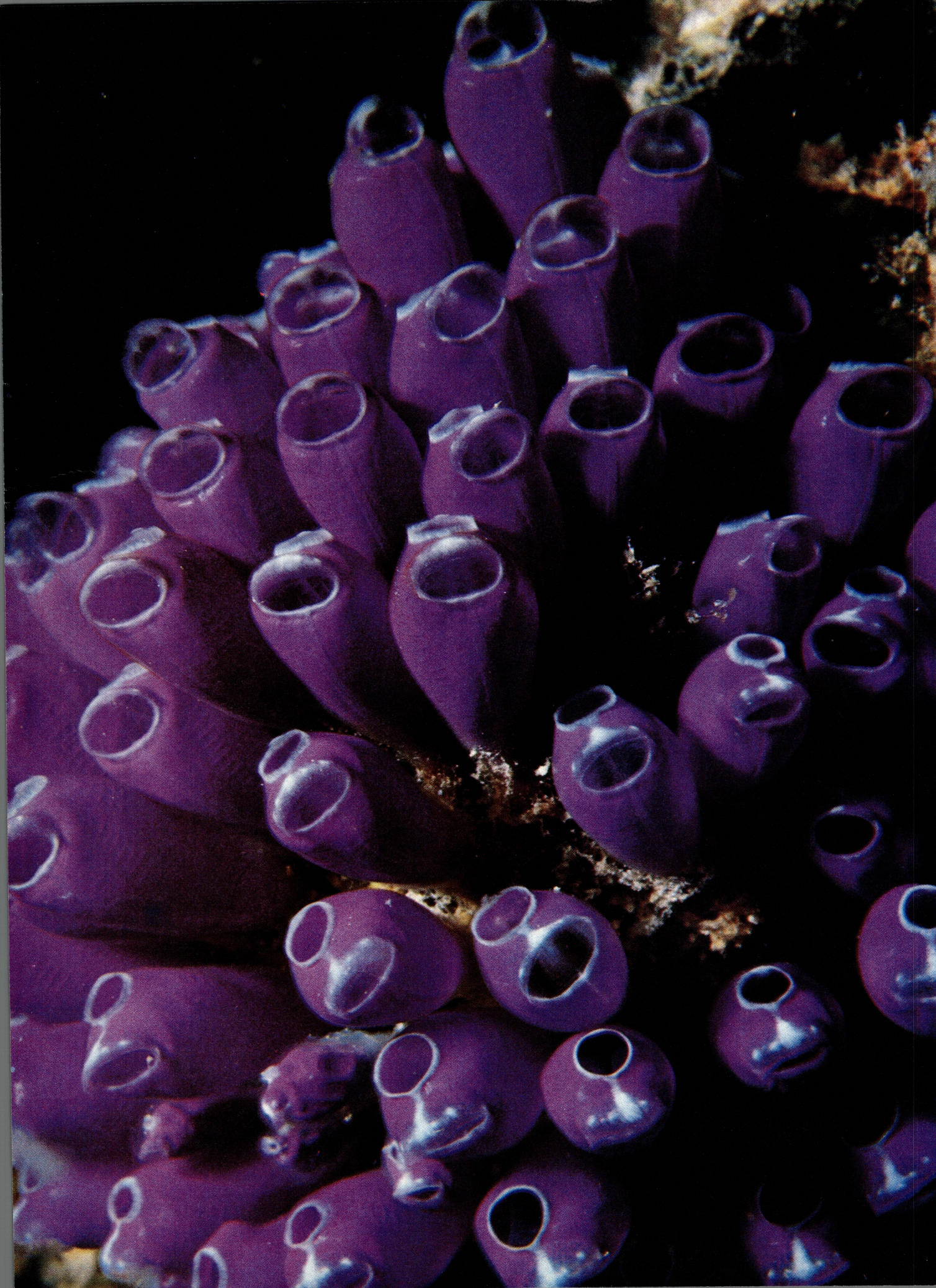
gonians, seaplumes, and other flower-like marine creatures swaying in the current. I pause and look up just in time to witness a marvelous sight — a large spotted eagle ray, with a six foot wing span and a 12 foot tail, glides past on its way to some secret rendezvous. The stately ray is accompanied by a smaller one which tracks its every move precisely. The pair glides off into the misty blue before I can snap even a single picture. My consolation is a lasting impression of one of the open sea's most beautiful visions. By now, my submersible pressure gauge shows 500 psi and it is time to start back to the dive boat.

Frenchcap Cay is just a small sample of the many, many spectacular dive sites to be found in the waters of the U.S. Virgins. The quality of diving here is as good as you will find anywhere in the Caribbean — and in some cases, even superior because of the uniqueness of

the bottom terrain and reef formation. The U.S. Virgins rank as one of the top five vacation dive destinations in the Western Hemisphere and for many divers, considered the best.

Ironically, the U.S. Virgins have not quite achieved the reputation for diving they so justly deserve. There are still many traveling divers who do not regard the U.S. Virgins as a serious dive location. Perhaps this is because the USVI's dive activities have been overshadowed by the worldwide image of beach resort hotels, condominium developments, sailboat charters, cruise ship ports-of-call and bargain filled free port shopping. The USVI has indeed achieved the image and reputation as a popular tourist destination, thus overshadowing the island's exceptionally fine underwater





attractions. How could a group of islands that offers so much on land still have good diving? Read on and find out.

The key to the U.S. Virgins' attraction for the experienced diver is this area's incredible variety of underwater experiences. There are three major islands (St. Thomas, St. John, St. Croix) and perhaps 100 small offshore islands, cays and rocky pinnacles. Among the multitude of underwater attractions are such distinctive variations as drop-off diving, shipwreck diving, offshore islands, rocky caves and tunnels, archways and canyons, unique pier diving, shallow coral gardens, underwater park trails, medium depth coral reefs and a half-dozen more experiences. One could say that the sum total of diving the U.S. Virgins is probably greater than any single part, for it is this widespread variety that adds such an exciting flavor to the vacation experience.

ST. THOMAS

St. Thomas is the heartbeat of the U.S. Virgins. Although it is only the second largest in size, it is by far the busiest of the three islands, serving as the central hub of commercial business activity, government and many resort oriented activities. It is the most crowded of the U.S. Virgins and one of the most lively.

Located on the south shore of St. Thomas, at the very edge of St. Thomas harbor, is the bustling city of Charlotte Amalie (Ah-Mahl'-Ya). The entire 20 block center of this metro area is a virtual shoppers' bazaar, with tourist filled sidewalks and curio shops crowded closely together. It is regarded as the busiest free port shopping district in the entire Caribbean. Charlotte Amalie is one of the most favorite ports-of-call for literally dozens of giant cruise ships that visit Caribbean islands weekly.

Of all the islands in the Caribbean, St. Thomas is the most popular choice of honeymooning couples who want to snorkel or sail during the day and go nightclubing in the evening. It is also a great spot for swinging singles because there are many opportunities to meet people who are the same age and share your interests.

Over the years, St. Thomas has grown to be regarded as the new Riviera of the Caribbean. Its magnificent beaches are rimmed with some of the finest hotels and condominiums to be found anywhere in this part of the world. Whether you go there in the middle of the winter or the height of the summer season, St. Thomas is always busy.

As for the diving, St. Thomas probably offers the greatest variety of undersea experiences. It has a fine selection of wreck dives, offshore pinnacles, submerged sea mounts, caves and tunnels, beach dives, and shallow coral diving.

You can have the best of two worlds by making your morning dives in the Atlantic Ocean (north side of island) and taking your afternoon plunge in the Caribbean Sea (south side) — all in the same day!

The dive sites around St. Thomas are basically segregated into three geographical areas. On the south side, facing the Caribbean, are a dozen offshore islands and cays offering a multitude of different locations. On the north side, facing the Atlantic, are another dozen offshore islands that offer an entirely different type of bottom terrain and marine life. Off the east end of St. Thomas is a third cluster of a half-dozen islands surrounded by some of the finest coral reefs in this part of the Caribbean. In addition to these offshore locations, there are another six to eight shore diving locations situated along both the north and south sides of the island. At last count, I documented more than 120 dive sites around St. Thomas alone. More are being discovered all the time because St. Thomas dive operators are trading up to larger dive boats and ranging further from home in quest of exciting dive locations.

One of the major underwater attractions, unique to St. Thomas, is the variety of wreck dives. Since the 18th century, St. Thomas has been a major shipping port and traffic in these waters has been intensive. As a result, the sea floor around St. Thomas is littered with the remains of perhaps 100 ships of all sizes and vintages. Of these, at least a half-dozen have been located and are dived regularly.

The **Cartanser Senior**, a 190 foot steel freighter, is the newest and most publicized wreck dive on St. Thomas. This little ship lies in a protected cove on the west side of Little Buck Island, four and one-half miles south of St. Thomas harbor. Because the wreck is so far offshore, it enjoys splendid visibility and has become a popular dive location with practically every dive guide on St. Thomas. The *Cartanser* lies upright on a flat sand bottom in 50 feet or water. Its hull is broken in half with the forward section tilted 30 degrees to port and nosed against a coral reef. While the wreck has been stripped clean of collectible artifacts, she does provide the perfect setting for wide-angle underwater photography. There must be at least one dozen good camera angles of the bow, ship's railings, deck winches, hatches and doorways. The *Cartanser Senior* looks the way every diver expects a shipwreck to appear. Visibility on this wreck often exceeds 100 feet, making photo efforts a pleasure.

One of my favorite wreck dives, especially for macro photography, is the **Major General Rogers** — a 120 foot long, steel-hulled Coast Guard vessel. This ship was purposely sunk as an arti-

cial reef and lies in the channel between Thatch Cay and the north side of St. Thomas. Gary Deering (Watersports Center) first showed me this shipwreck three years ago. Utilizing shore bearings, Gary pinpoints the wreck and drops his anchor smack on the midships deck. Because of a slight current, we use the anchor line as a guide to the deck at 45 feet, and then swim back to the stern rail. Schools of grunt and snapper mill around in the ship's stern hold, finding it a quiet resting place from the current. We drift down the stern of the ship and settle to the sand bottom at 70 feet, close to the rudder. The ship's propeller is still in place but two of the blades are broken off. My attention is immediately drawn to the magnificent array of encrusting sponges and hydroids covering the surface of the propeller. There must be at least a dozen small invertebrates — prize winning macro photos subjects for any photo contest. Growing out from the hull, just above the propeller, is an absolutely pure white alcyonarian coral with powder puff polyps extended. Everywhere I look there is another type of invertebrate — excellent photo subjects.

From the ship's propeller, we cruise the length of the ship along the wreck's hull. The ship's side is a vertical wall covered with small corals, colorful sponges, alcyonarian corals, feather-duster worms, and clusters of bright blue tunicates. In fact, there are hundreds of tunicate clusters — more than I have ever seen in any reef location. Most of them are pale blue, but occasionally I find one that is deep purple, like a Concord grape. This wreck offers a unique assortment of marine life seldom seen on any coral reef.

The **Grain Wreck** is one of the deepest wreck dives off St. Thomas and is strictly limited to expert divers with considerable wreck diving experience. While this dive is not for everyone, it does provide an opportunity for some high voltage action. The wreck lies approximately five and one-half miles west of St. Thomas harbor in an area of open ocean. While her origin is somewhat of an obscure mystery, the ship is believed to have been a 450 foot long steel-hulled cargo vessel carrying a load of grain. The majority of her wreckage lies in 125 to 135 feet of water. Visibility varies considerably and there are sometimes strong currents in the area. I made my first dive on this wreck with Armando Jenik (St. Thomas Diving Club) and found it to be a thrilling experience. Armando led our dive team down the anchor line, pushing hard against the surface currents. Visibility for the first 70 feet was poor, but improved greatly as we neared the bottom. The shipwreck is immense in size and virtually dwarfed the divers exploring her decks. She is a jumbled mass of steel

beams, twisted deck plates and broken ribs. It's obvious the ship has been dynamited and there were rumors that Navy UDT teams once used her for demolition practice.

Because of its size and location, the Grain Wreck is a gathering place for big fish. Before I had even touched the first piece of wreckage, I sighted a group of amberjack cruising above her decks. Next came a school of horse-eye jacks, then a group of crevalle jacks, and even a few giant snapper were skulking among the debris. It was like Times Square underwater! At one point, I had a fleeting view of a 200 pound jewfish swiftly sliding into the shadows of a cargo hold. And in the distance, I could barely make out the hazy shadows of two or three sharks circling the wreck at the very outer limits of our visibility. While the visit was brief, it was indeed a memorable one.

St. Thomas is by no means limited to wreck diving. Other fascinating undersea attractions indigenous to these waters are the outstanding formations of stone tunnels and caves. St. Thomas and the small islands surrounding it are all of volcanic origin and the prehistoric upheaval that created these islands also created many marvelous undersea formations. The tunnels and caves of St. Thomas are much different from the coral caves one generally associates with the Caribbean. These formations are generally located in shallow depths and con-

sist of many extraordinary shapes, sizes and textures.

One of the finest examples of these stone tunnels is located at the western end of **Thatch Cay**. I made my first visit to the Thatch Cay tunnels with dive guide Gary Deering (Watersports Center). Gary anchored the boat close to the island's rocky shore, in the lee of a small protective cove. The tunnel entrance is very close to the surface and the floor of this rocky channel ranges from 10 to 20 feet deep. The tunnel itself is approximately 25 feet long, 20 feet wide and has vertical stone walls. The floor of the tunnel is covered by coarse grain sand in some areas and smooth stone in others. Perhaps the most amazing aspect of these



tunnels is the painted walls. These vertical stone faces are carpeted with a dazzling array of tiny cup corals, encrusting sponges, small stony corals, and a fascinating variety of miniature invertebrates. When I turned on my dive light, the beam revealed a montage of reds, yellows, blues, oranges and pinks.

Approximately two-thirds of the way under the island, our tunnel made a sharp left turn and we could see the opposite entrance. As we emerged from this opening, we encountered a tremendous school of tiny silver-sided baitfish. The school reached from the ocean floor to the surface and stretched for at least 100 yards. The tiny fish swirled about our heads like snowflakes in a blizzard. The scene was electric with excitement and we could sense the tension as the little fish darted back and forth in a nervous symphony. Suddenly, a large silver torpedo glided into view as the baitfish parted in front of its menacing mouth. It was large, perhaps 80 pounds or more. Its big, saucer-shaped eye looked alert, almost hungry. The first tarpon was followed by four more, all with large silvery scales and sharply forked tails. The tar-

pon is a remarkably impressive fish under most any circumstance, but here among the baitfish, its character and appearance were even more breathtaking. We were witnessing one of nature's classical struggles, a marauding pack of hunters swiftly decimating the ranks of a vulnerable school of baitfish, a sight rarely witnessed by most divers.

Still another popular site for tunnel and cave exploration is a place called **Cow and Calf**. Because it is located on the Caribbean side of St. Thomas, one-half mile from Cowpet Bay, Cow and Calf has a different appearance than Thatch Cay Tunnel. The entire area surrounding the tunnels is prolific with stony corals, sea-whips, seafans, and seaplumes. The bottom terrain looks much more like a normal coral reef with just a hint of stony tunnel formations below.

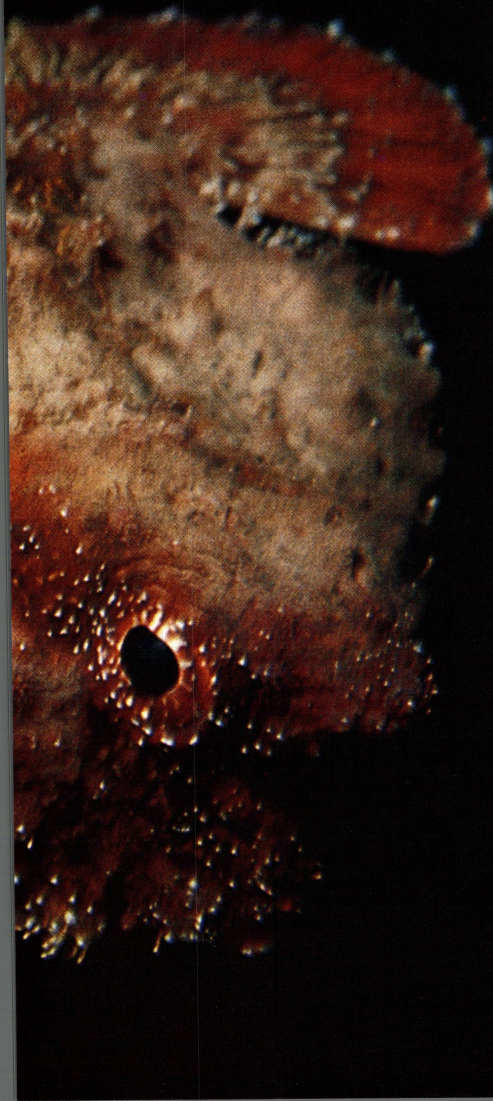
Rather than just one major tunnel, Cow and Calf is a labyrinth of rocky tunnels, passageways, small caves and archways. There is also a vertical chimney and several small canyons which complete this marvelous maze of passageways. The best part of Cow and Calf is that it offers just about every type of marine formation found on a coral reef. There are iridescent vase sponges, solitary cup corals, and lovely tangles of finger sponge. It is an underwater photographer's fantasy world come true and the perfect undersea studio. Cow and Calf is loaded with all types of small reef fish. Queen angelfish play hide-and-seek among the rocks while trumpetfish hang upside down among the branches of gorgonians. There are schools of grunt, small snapper and plenty of squirrelfish. At certain times of the year, divers find nurse sharks snoozing in the tunnels under this rocky formation.

When it comes to shallow and medium depth coral reefs, St. Thomas excels. There are more than 80 such sites scattered all around the island with the best locations among the offshore cays and

islands. Each dive guide has a repertoire of at least 20 popular spots, and perhaps six or seven secret ones. The one I visited is a particular favorite with both Palmer Williams (Aqua Action) and Gary Deering and is known as **Little St. James**. This reef is located off the southeast side of Little St. James Island, close to the Phillsbury Sound Channel. It is a convenient location, less than a 15 minute ride from the dive shop.

Little St. James is a typical Virgin Islands coral reef with dive depths ranging from 15 to 40 feet. The ocean floor offers a variety of different bottom formations, ranging from tall pillar corals to elegant elkhorn corals to a semi-circular rock ledge with deep undercuts and small caves. It is along this ledge that one may find a fabulous array of fascinating subjects for close-up photography. The underside of the ledge is lined with brilliantly colored encrusting sponge spanning almost every color of the spectrum. Many small crevices and pockets are filled with lacy pink or purple bryozoans. The ledge is also a favorite hideout for hundreds of brightly colored fairy basslets; half-purple and half-yellow.

In the deeper waters, one will find several magnificent stands of stately pillar coral. There are at least six or seven of these



photographs/Geri Murphy

Juvenile batfish (left), adult scorpionfish (right)/Frederiksted Pier, St. Croix.

slender statues, some reaching five feet in height and containing as many as 15 coral spikes. Spaced between the pillar corals are amorphous forms of star coral, brain coral and other stony coral formations. These are ideal locations for finding colonies of Christmas tree worms, featherdusters and small sponges. Little St. James is a veritable fairyland of marine life, affording endless hours of discovery.



Perhaps the most exciting news is the opening to sport divers of a new group of islands which lie two to ten miles west of St. Thomas harbor. The offshore islands and reefs of this area are virtually untouched by resort divers because of their remote location from most St. Thomas hotels. However, the St. Thomas Diving Club, located at the western edge of the St. Thomas harbor, has recently expanded its dive facilities and added two high speed inboards to its dive boat fleet. Club Manager, Richard Doumeng, has announced plans for a program of regularly scheduled weekly trips to such exciting locations as Flat Cays, Saba Island, Savana Island, and Saba Dry Rocks.

The most spectacular dive in this new island group is a distant volcanic pinnacle known as **Sail Rock**. It lies four miles south of the western tip of St. Thomas — a spot rarely seen by tourists. The location is marked by a giant rock with towering vertical sides and a crown of white. From a distance, this large rock looks very much like the white sail of a ship at sea.

Sail Rock offers the same type of crystal clear visibility and fabulous marine life as one would find at French Cap Cay. Underwater, the reef is a sheer vertical wall of volcanic rock that plunges downward to 90 feet. It is a place of stunning beauty and high voltage fish action. All types of pelagic fish frequent this location as it is the only prominent reef within miles. It seems to be a magnet for all types of marine life cruising this area of ocean. You are likely to see schools of jack, numerous eagle rays, large amberjacks, tuna, barracuda and sometimes sharks. There is even a giant jewfish which makes an occasional appearance at this location. One word of caution, however, Sail Rock frequently has strong ocean currents which are totally unpredictable. This location is for expert divers only.

ST. JOHN

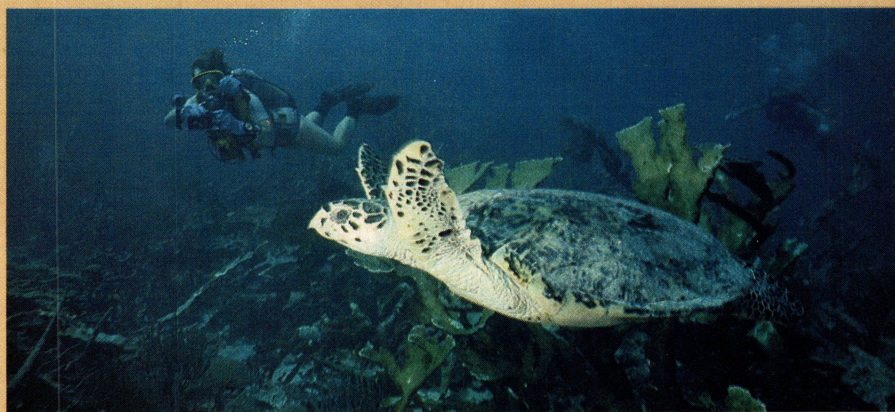
Immediately next door to St. Thomas, less than two miles across Pillsbury Sound Channel, lies St. John — an island of quiet solitude and immense natural beauty. The two islands could not be more opposite in appearance, tempo, lifestyle.

St. John is an island with snob appeal. It has no airport and its residents don't really want one. The island can only be reached by inter-island ferryboat or private yacht, thus keeping traffic flow to a minimum. As you may have already suspected, the residents of St. John jealously guard the natural beauty of their undeveloped island, almost to the point of discouraging widespread tourism development. There is only one major hotel on this island, two campgrounds and a few small guest houses. The entire



Gary Deering at Thatch Cay Tunnel, St. Thomas

photo/Geri Murphy



Buck Island National Park, St. Croix

photo/Brian Max Friedman

island possesses a charming country atmosphere with total absence of traffic jams, amusement centers or night clubs. If you want to get away from it all, St. John is indeed the place to go.

St. John has managed to retain an atmosphere of idyllic tranquility and natural charm because it was planned that way. At least one-third of the island has been declared a national park and

will remain undisturbed for eternity. There are places on this island where a visitor can hike for miles without ever seeing another soul. There are secluded white sand beaches which stretch for miles without evidence of a single human footprint. And yet, St. John is the home of one of the most exclusive resort hotels in the Caribbean — Caneel Bay Plantation. Set on 350 acres of park-like grounds,

White Christmas tree worm, Frederiksted Pier, St. Croix

photo/Geri Murphy

this sprawling resort can accommodate up to 300 guests and frequently hosts heads of state, movie stars, and music idols.

Strangely enough, St. John serves both ends of the tourist spectrum. It is one of the only islands in the U.S. Virgins which encourages outdoor camping. At Cinnamon Bay Campgrounds, visitors can rent tents and camping supplies for a unique opportunity to live close to nature.

As for diving, St. John is surrounded by some of the loveliest shallow coral reefs and sea gardens to be found anywhere in the Virgin Islands. It is a perfect place for snorkelers and beginning scuba divers who want to explore the undersea world. Beautiful elkhorn formations and colorful sea fans can be found in depths ranging from 5 to 25 feet.

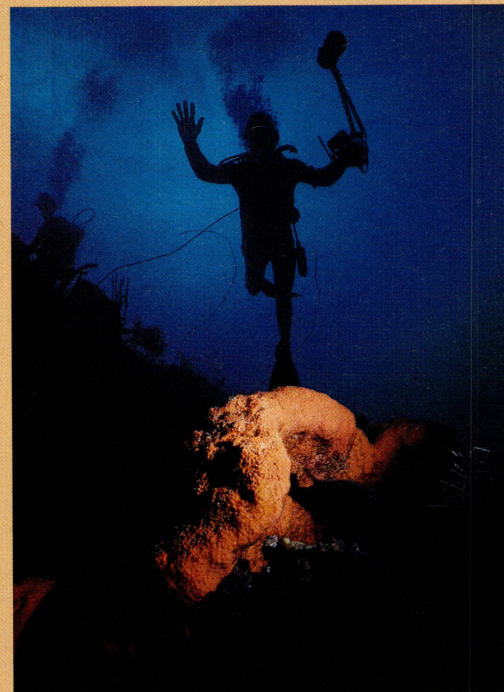
As for the experienced diver, St. John is an island of pretty coral reefs teeming with tropical reef fish and tiny invertebrates. In other words, it is a pleasant place to dive and simply relax. If you are searching for drop-offs or shipwrecks, you will have to try one of the other Virgins. However, St. John does offer an opportunity for adventure diving as it is blessed with six to eight offshore islands and rocky pinnacles, mostly located off the north side of the island. It is these offshore dives which offer the kind of thrills and excitement associated with the big fish action inherent to the Virgin Islands.

Carval Rock is undoubtedly one of the most exciting dive spots off St. John. It has everything from shallow coral gardens to deep reef diving — plus more fish action than you can possibly imagine. It lies two miles north of Cruz Bay at the western end of St. John. Carval Rock is one of Gary Deering's (Watersports Center) favorite dive locations, but it is frequently used by many other St. Thomas and St. John dive operators as well. Carval is a cluster of giant stone boulders rising above the surface of the sea off the eastern tip of Congo Cay.

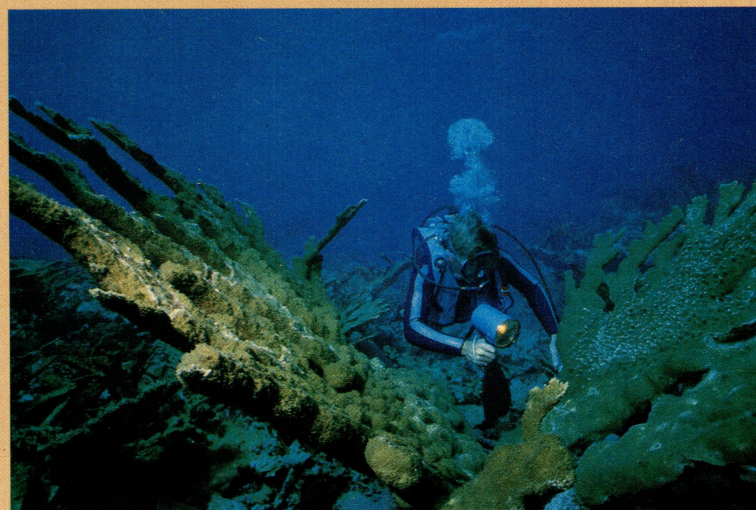
I can recall one memorable visit to this location when I slipped into the water and found myself immersed in a silvery cloud of baitfish. There must have been thousands of them, reaching from the very hull of the dive boat all the way to the sea floor 25 feet below. The reef actually started right at the surface where the vertical face of the stone boulders continue downward to a depth of 15 feet. I was amazed by the abundance of healthy marine life which covered the rocks even in shallow water. Small sea fans, cup sponges, azure vase sponges and hard coral seemed to be tucked into every nook and cranny of the wall. It was a veritable bonanza of natural life, including dozens of arrowcrabs, coral shrimp, tube worms, and coral polyps just waiting to be photographed.



Becky Laub, Frenchcap Cay, St. Thomas



Salt River, St. Croix



Larry Angus, Long Reef, St. Croix

photos/Geri Murphy

The reef seems to shelf off briefly at the 20 foot level before continuing steeply downward. At the 40 foot level, I encountered a dense thicket of swaying black gorgonian fans two to four feet tall. The size and number of these fans indicated the possibility of strong currents and so I hugged the bottom of this sloping reef. Gary had mentioned that currents at Carval Rock can range from one-half to one and one-half knots. At a depth of 80 feet, the slope begins to level off into a hard packed sand bottom, indicating I had reached the edge of a swift water channel. It was here that I encountered a really strong current and

had to remain hidden behind large rocks and coral heads. The base of this reef was teeming with big fish and I observed schools of big snapper, platter-sized angelfish, horse-eye jacks, and a dozen other species. It was indeed one of the fishiest dive spots I have found in the Virgin Islands.

During the return swim up the reef slope, I came upon several large tarpon feeding on the baitfish. Watching the tarpon work the baitfish is always a heart-stopping experience. For most Caribbean divers, a close encounter with a tarpon is a glorious, once-in-a-lifetime experience. Here in the Virgins, it is almost

a daily occurrence, and visiting divers often see three or four of these majestic fish in a single dive! Gary Deering claims that there is always a school of 40 to 50 tarpon which hang around Carval Rock.

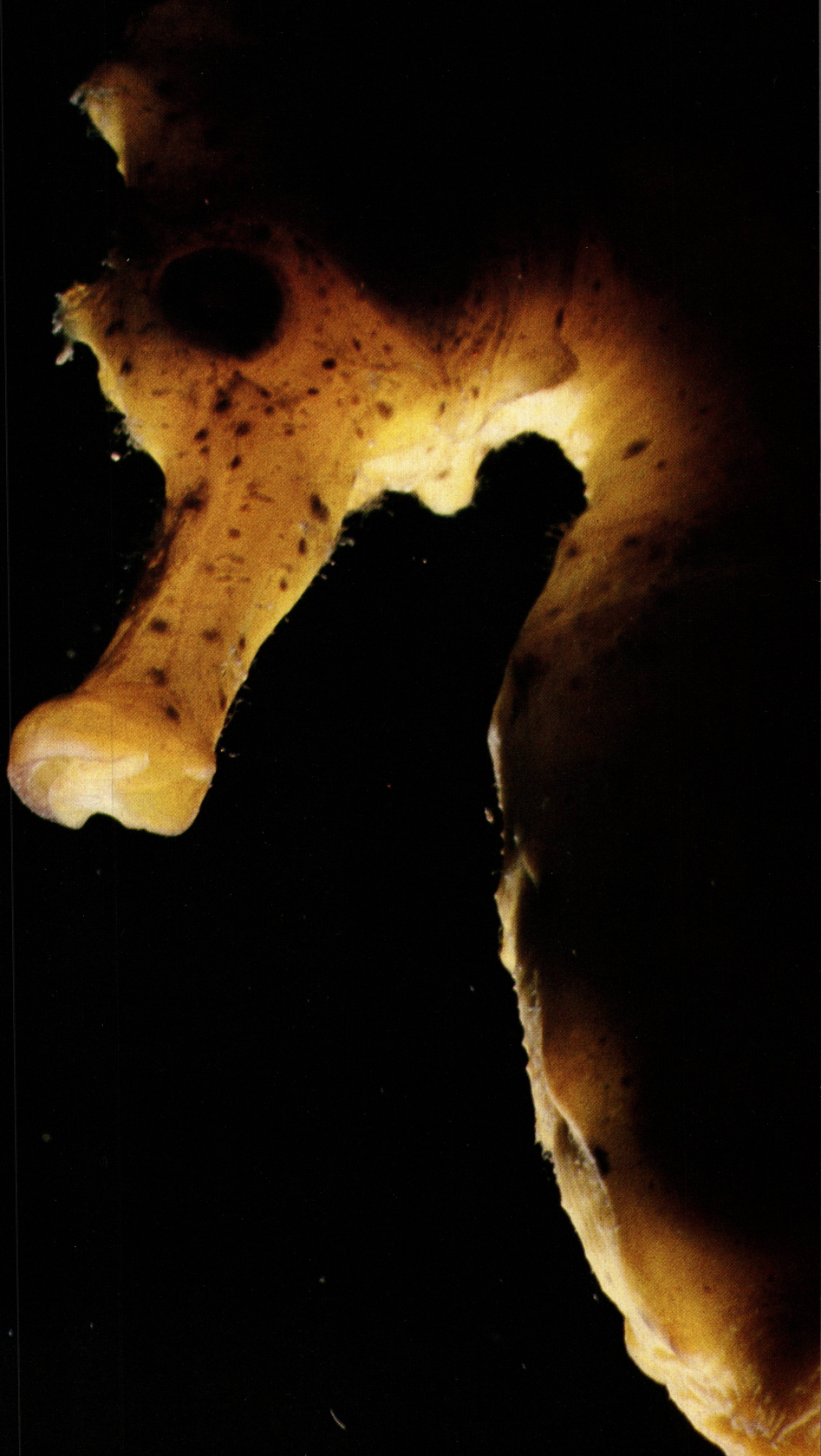
Congo Cay is still another dive location in the same vicinity as Carval Rock. Congo is a long skinny island of solid rock which rises vertically from the ocean like the dorsal fin of some giant sea monster. It possesses a stark kind of natural beauty and most divers who visit this location enjoy the sight-seeing almost as much as the diving.

The best diving at Congo Cay can be found right off the western tip of the island. The reef actually begins at the surface where the walls of the island continue downward in almost vertical fashion to 15 feet. From this point, the reef slopes on a more gradual angle to a maximum depth of 70 to 80 feet. Much of the slope is a jumble of stone boulders and rocky ledges, together they form a natural undersea staircase to the depths below. The rocks are covered by a multitude of marine creatures including purple sea fans, tall seawhips, fire coral, black gorgonian fans and small sponges. In the shallows, there is an abundance of squirrelfish, striped grunts and small eels. At deeper depths, one encounters tarpon, eagle rays and barracuda. Approximately 50 yards off the point of the island lies a large square-shaped stone boulder which must weigh ten tons or more. This unusual formation is literally covered with bright yellow cup corals and dozens of tiny marine creatures. It is a perfect location for the underwater photographer seeking macro subjects.

If fish photography is your specialty, you may want to consider a visit to **Lovango Cay**, one and one-half miles north of Cruz Bay. This island is an extremely popular dive site for both St. John and St. Thomas dive operators, as it is only a short 15 to 25 minute boat trip. The best diving is found on the south side of the island where a lovely coral reef is situated only 75 yards offshore. Diving depths on this coral reef range from 15 to 50 feet.

I was first introduced to this lovely site by Jack Bosh (St. John Watersports), several years ago. An underwater photographer/instructor, Jack knew exactly where to find all of those tantalizing reef fish which make such wonderful undersea models. The reef at Lovango Cay is loaded with friendly squirrelfish, brightly decorated sergeant majors, all types of hamlets, and lovely damselfish. Of particular interest are the moray eels which inhabit the coral heads and appear quite happy to pose for pictures. There are both black and white spotted morays, and the smaller, more beautiful, golden

Yellow seahorse , St. Croix





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tail morays. Jack led me to one particular coral head where he gently pointed out a pair of juvenile jackknife fish hiding in the protection of a coral overhang. These delicate creatures make marvelous subjects for really striking photographs, and Lovango Cay is one of the only reefs where jackknife fish are seen regularly. At the base of the gently sloping coral reef, we encountered a pair of stingrays and could see an eagle ray gliding off in the distance.

Lovango Cay is by no means limited to reef fish photography. It is also an excellent spot for wide-angle work. There is a giant pillar coral at the west end of the reef in 20 feet of water. This striking formation stands eight feet tall with one of the cylindrical pillars measuring 16 inches in diameter. For the macro photo buff, this reef offers a marvelous selection of Christmas tree worms, feather-dusters, crabs and shrimp.

ST. CROIX

Forty miles south of St. Thomas and St. John lies the big sprawling island of St. Croix. It is the third member of that magnificent trio which make up the U.S. Virgins. And yet, it is strikingly unique.

Geographically speaking, St. Croix is entirely different from its Virgin sisters to the north. It is huge by comparison, measuring more than twice the size of St. Thomas and at least four times larger than St. John. Most important is the fact that St. Croix is encircled by at least 50 miles of fringing coral reefs.

St. Croix rises up from the surrounding ocean depths like a towering mesa. Much of the northern and western shorelines are vertical drop-offs only a few hundred yards off the beach. St. Croix has only one offshore island — Buck Island National Monument — which has been proclaimed a national underwater park. Because of its size, St. Croix offers a diverse landscape. The eastern end of the island is mountainous and arid, with cactus growing along the hillsides. The central part of the island is flat land — perfect for agriculture and industry. The northwest corner of the island is a rugged mountainous region, still undeveloped and sparkling with natural beauty.

The port city of Christiansted is located on the north coast and serves as the central hub for both the tourist industry and dive business. It is an ancient settlement, complete with Danish architecture, narrow streets and historic monuments. Most of the buildings have been completely restored and now serve as a quaint shopping district for visiting tourists.

Situated at the western end of St. Croix is the city of Frederiksted. It is a much more quiet, less commercial settlement with a picturesque seaside setting. Some of the loveliest ocean sunsets can be viewed and photographed here. Freder-

iksted's greatest claim to fame is a 1000 foot long pier which is utilized by visiting cruise ships and ocean research vessels.

From a diver's point of view, St. Croix offers the one major attraction which both St. Thomas and St. John lack — wall diving. St. Croix is blessed with miles of fantastic vertical drop-offs which will delight even the most seasoned wall diver. Still another unique attraction, exclusive to St. Croix, is its outstanding pier diving, regarded as possibly the finest in the Caribbean. It is these unusual attractions which make St. Croix a necessary and welcome addition to the underwater potpourri which the U.S. Virgins offer.

My introduction to St. Croix wall diving was made many years ago in the company of Brian Max Friedman (Pressure Ltd.) That first dive was enough to hook me on St. Croix's spectacular undersea beauty and I have been going back year after year. Brian guided his dive boat to a popular spot known as **Salt River Drop-off**, four miles west of Christiansted Harbour. We anchored on the top edge of the wall in 25 feet of water.

Upon our descent, I was amazed to find the top of the wall adorned with a magnificent array of elkhorn coral formations, big, dome-shaped brain corals, and amorphous mounds of star coral.

changing profile which provides an endless opportunity for interesting underwater photographs and fascinating exploration. Best of all, the face of the drop-off is absolutely loaded with all types of fans, corals, sponges and other forms of marine life.

Brian knew that I was seeking colorful photo subjects and so he led me directly to a particularly ornate cluster of yellow tube sponges. Within seconds, I had positioned myself for an up-angle shot of the sponge and reef above it. A brilliant flash of color exploded before my camera lens as I fired off my underwater strobe. We soon moved onto other formations. Brian pointed out brown basket sponges, vase sponges, finger sponges and purple tube sponges. One after another, I dutifully captured these on film while Brian continued his quest for more subjects. Finally, Brian revealed his most magnificent subject — a gigantic orange elephant ear sponge measuring six feet across. It is a marvelous specimen, rich in color and texture. The wall dive was everything I had dreamed of — and I am convinced that St. Croix stands among the very best for wall diving adventure.

Perhaps the most popular and best known of all St. Croix drop-offs is a spot called **Cane Bay Wall**. This location is visited by just about every St. Croix dive



General Rogers Wreck, St. Thomas

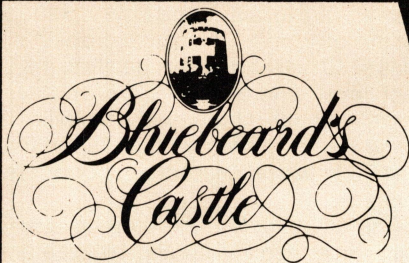
photo/Paul J. Tzimoulis

The drop-off was alive from top to bottom. Underwater visibility was running between 60 to 70 feet, which is considered average for Salt River. Brian explained that this particular drop-off lies directly off a large salt water estuary which periodically delivers enormous quantities of nutrient-enriched water with the tidal flow. It is this constant feeding of the coral reef which has made Salt River so incredibly rich with marine life.

The face of the wall is deeply etched with a series of coral canyons, crevices, undercuts and small caves. It is an ever

operator because it offers exceptionally beautiful scenery and dynamic action. I have been here many times with a variety of different dive guides and always found it to be an exciting experience.

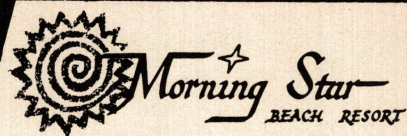
Cane Bay Wall is located on the north coast of St. Croix, approximately nine miles west of Christiansted Harbour. The drop-off in this area comes very close to shore and it is only a 200 yard swim from the beach. In fact, it is one of the few drop-offs in the entire Caribbean which can be dived either by boat or from the beach. A word of caution however, a



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shore dive should not be attempted unless you are in fairly good physical shape for the long swim. The actual drop-off begins at 40 feet and slopes gently to the 80 foot level where the incline becomes more vertical. Underwater visibility at Cane Bay is generally much better than Salt River, with 100 foot clarity considered average.

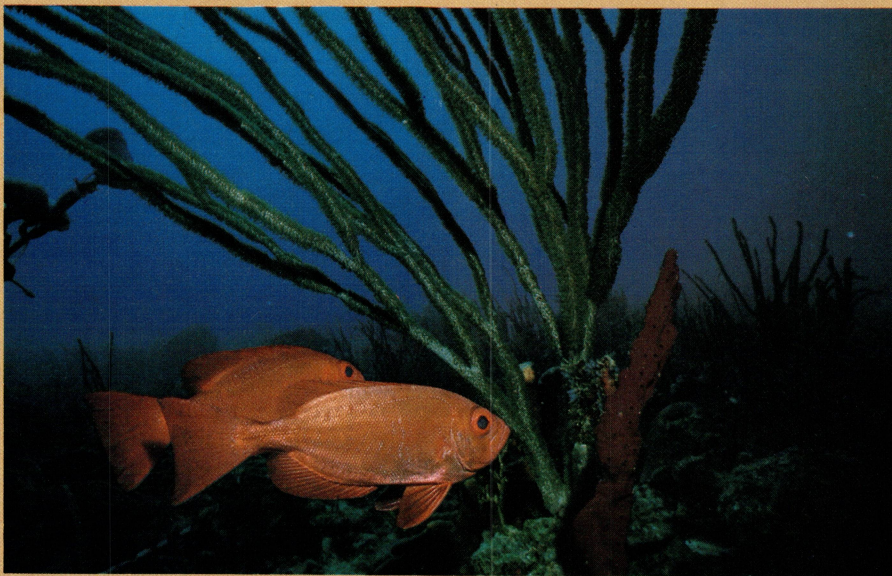
The entire face of the drop-off is alive with large healthy corals, big seafans, gorgonians of every type, and spectacular sponge life. Because of the increased visibility, the appearance of this reef is almost awesome.

On one especially memorable dive, I can recall Bret Gilliam (V.I. Divers, Ltd.) leading me to one of the most incredible sponge formations I have ever seen anywhere in the Caribbean. Descending to a depth of 120 feet, we came upon a remarkable cluster of three giant sapphire sponges joined together at the base. Each of the sponges measured two and one-half feet high and 12 inches in diameter. Their iridescent coloration possessed an almost radiant quality and I could hardly keep from shooting an entire roll of pictures at this one location. Crouched behind the shimmering sponges were three or four large banded coral shrimp who obviously used this formation as their undersea castle. Nearby were several equally beautiful formations of slender purple tube sponges, brilliant yellow horn sponges, and basket sponges measuring three feet in diameter. The combination of vividly colored sponges and deep blue water background provided a setting for high quality photography.

Cane Bay Wall is not the kind of reef that can be fully appreciated in just one dive. This section of drop-off is almost one-half mile long and contains at least eight different dive sites which offer really fine wall diving. Each dive guide seems to have his own secret spot, thus offering the visitor a wide selection of experiences. Just west of Cane Bay are three more spectacular drop-offs called **North Star Wall**, **Sweetbottom Wall** and **Davis Bay Wall**. While not as well-known, these drop-offs offer equally fine wall diving opportunities and an additional variety of underwater scenery.

St. Croix is by no means limited to wall diving alone. This island offers an excellent selection of medium depth reefs ranging between 40 and 80 feet. In fact, I consider the fish action on these reefs to be as exciting as the drop-offs are beautiful. My favorite is a place called **Green Cay Slope** which is located east of Christiansted Harbour, halfway between the harbour entrance and Buck Island Underwater Park. Larry Angus (Caribbean Sea Adventures) feels it is one of the best dives that St. Croix offers.

A typical dive at this location starts with Larry anchoring his dive boat on the upper edge of the slope. He carefully explains that while Green Cay is sometimes



Pair of bigeyes, Green Cay Slope, St. Croix

photos/Geri Murphy

called a drop-off, this is really a misnomer. The reef is actually a coral slope which begins at a depth of 40 feet and slants downward on a 45 degree angle to a depth of 80 feet. At the base of the reef, the sea floor levels off into a horizontal desert of pure white sand.

I follow Larry's bubbles on the short descent to the coral reef below, as I try to get my bearings. Each dive at Green Cay Slope is different since the entire reef is almost a mile in length and the dive boat is never anchored at the same spot twice. From above the reef appears to be a large sprawling field of tightly packed corals. Visibility is excellent, running somewhere between 125 and 150 feet.

As we begin our swim down the coral slope, Larry points out several really fine specimens of basket sponges, barrel sponges, yellow tube sponges and azure vase sponges. The reef is alive with marine life and I quickly notice the presence of a tremendous number of tropical reef fish. Everywhere I look, there are inquisitive pink squirrelfish, slender trumpetfish, elegant angelfish and a

dozen more species. It is a perfect location for fish photography.

At a depth of 70 feet, Larry points out an unusually large seawhip which is bent in the gentle flowing current. Beneath the branches of the seawhip are four of the most magnificent big eye snapper I have ever seen. Feeling secure under the protection of the seawhip, the four fish remain almost motionless as I approach them with camera and strobe. Each of the big eyes is at least one foot long and bright red in coloration. Their giant red and black eyes are riveted on my every move and follow my motions in unison. Finding a big eye out in the open is rare, but being able to photograph four of them at close camera range is a miracle!

Just about the time I have finished firing a half-roll of pictures of the big eyes, Larry points out a brilliant orange pillow sponge at 65 feet. I congratulate myself on the good fortune of having two equally colorful photo subjects on the same dive and quickly jockey into position for some close-up photos. No sooner do I fire off the first shot than Larry arrives with a

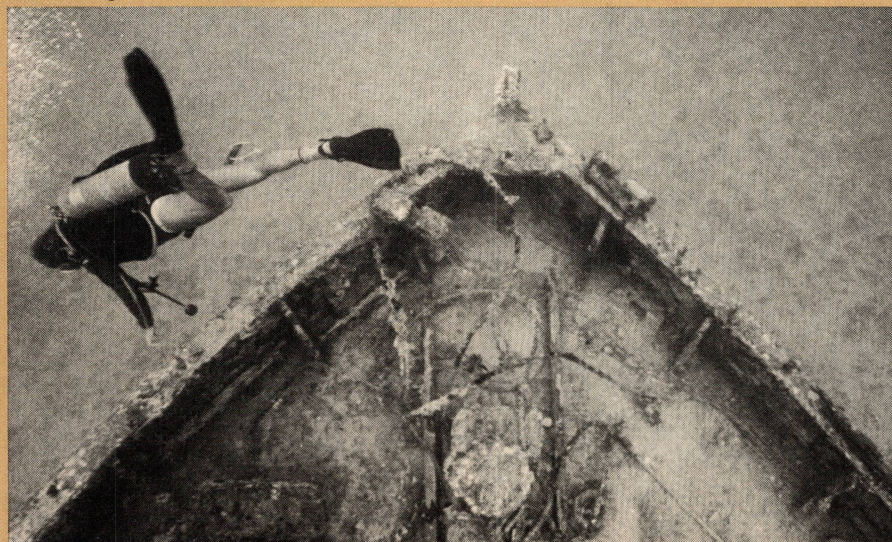
large puffer fish in hand. It's a photo bonanza! Green Cay Slope is almost famous for its abundance of puffer fish. I have seen at least one on every dive and frequently two or three. Larry has an uncanny ability for catching these creatures by hand and exciting them sufficiently so their bodies swell up to the size of a volleyball, forming a prickly balloon. The combination of the orange sponge and Larry with his puffer fish is a photographer's dream come true.

With our air supply running low, Larry begins the return swim to the dive boat. I am completely out of film and happy as a clam, when Larry points toward the edge of the reef. Less than 100 feet away, we watch a formation of five eagle rays swim past us on their way to Buck Island. Although I couldn't capture the scene on film, the vision of these majestic creatures is firmly imprinted in my mind.

The **Frederiksted Pier** is possibly one of the most bizarre and beautiful shallow water dives to be found anywhere in the U.S. Virgins. In fact, it is so unique that one can only describe it as a one-of-a-kind dive adventure. Located on the western shore of St. Croix is a 1000 foot long commercial pier which juts straight out into the Caribbean Sea. The pier is supported by some 600 concrete pilings rising up from depths of 20 to 45 feet. Crammed around these pilings is the most spectacular array of tiny creatures imaginable. Each individual piling is heavily encrusted with sponges of every color and shape. Sprinkled among the sponges are thousands of tube worms, crabs, shrimps, baby lobsters and other invertebrates. And cruising among this forest of pilings are perhaps 100 different species of tropical fish including several species so rare that they are not found anywhere else in the Virgins. Frederiksted Pier is a veritable supermarket of macro creatures where underwater photographers can shop for precisely the right brand.

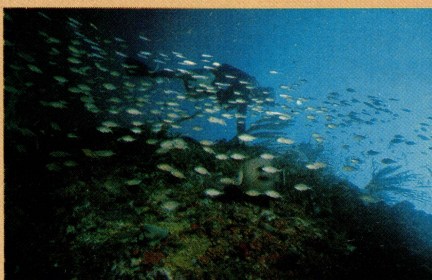
On a recent visit to Frederiksted, I dived this structure. Dive guide Larry Angus (Caribbean Sea Adventures) anchored his boat just off the outer pilings and led me to an area where the Christmas tree worms were so thick that it was almost impossible to get a clear shot of a singular gill plume. I counted 27 different colored Christmas tree worms on a single piling and perhaps a total of 50 different color combinations among neighboring pilings. The Christmas tree worms were not only abundant but also very large and often packed close together in groups of six to ten. Nearby, we encountered literally dozens of large arrowcrabs and banded coral shrimp. At the base of the pilings, in 40 feet of water, I was able to photograph two different scorpionfish, a batfish, a pair of flying gurnards, and three box crabs. I managed to do all of this on a single dive and still have air to spare. The heavy concentration of marine creatures enables an underwater

General Rogers Wreck, St. Thomas



photographer to increase his/her photographic productivity by at least tenfold. This is why Frederiksted Pier has become almost a mecca to underwater camera buffs.

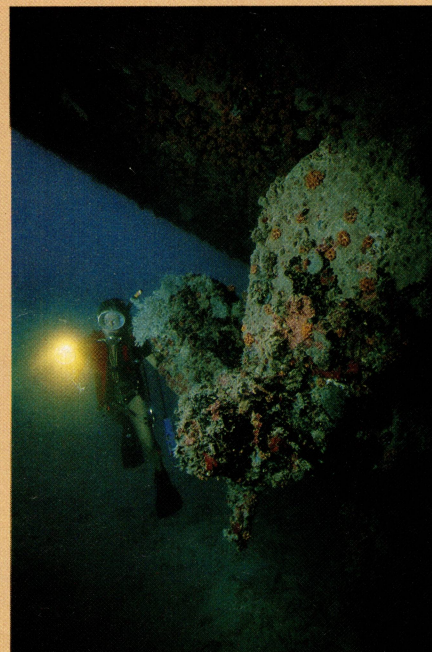
At night, the pier is a psychedelic palace of swirling colors and exotic marine animals. It is possibly the finest night diving experience in all of the Caribbean. I can recall one sojourn with Ron Cuttler (Cay Divers) in which we encountered and photographed at least ten seahorses. Their colors ranged from bright yellow to gold, to maroon, to orange. I saw more seahorses in one night than in a lifetime of diving, and yet this was only the beginning. Ron next pointed out two baby lobsters small enough to fit within the confines of my close-up lens framer. On the very next piling, I discovered a juvenile cowfish, the size of a sugar cube and bright yellow with black polka dots. The finale came when Ron pointed out a splitlure frogfish nestled at the base of a sponge. He was a big one, measuring over four inches, and soft lavender in color. The frogfish is a rare find and most veteran divers consider themselves fortunate if they see one of these remarkable fish in a lifetime of diving. Here at Frederiksted Pier you are likely to find unusual creatures on almost every dive. Night or day, the Frederiksted Pier offers an opportunity for some very strange and wonderful encounters.



Gary Deering, Tobago Cay, St. John



Eastern Airlines, L1011



Becky Laub, General Rogers Wreck

photos/Geri Murphy

The preceding narrative is but a small sampling of the dive adventures which can be enjoyed in the U.S. Virgins. It would take a 600 page book to fully describe the more than 200 different dive spots which abound in these islands. Variety is one of their chief attractions and keeps many divers coming back year

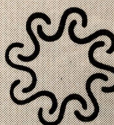
after year. For more information on exciting dive spots and specially scheduled trips, contact the dive operators listed in this section's chart of U.S. Virgins Dive Operators.

SHOPPING TIPS

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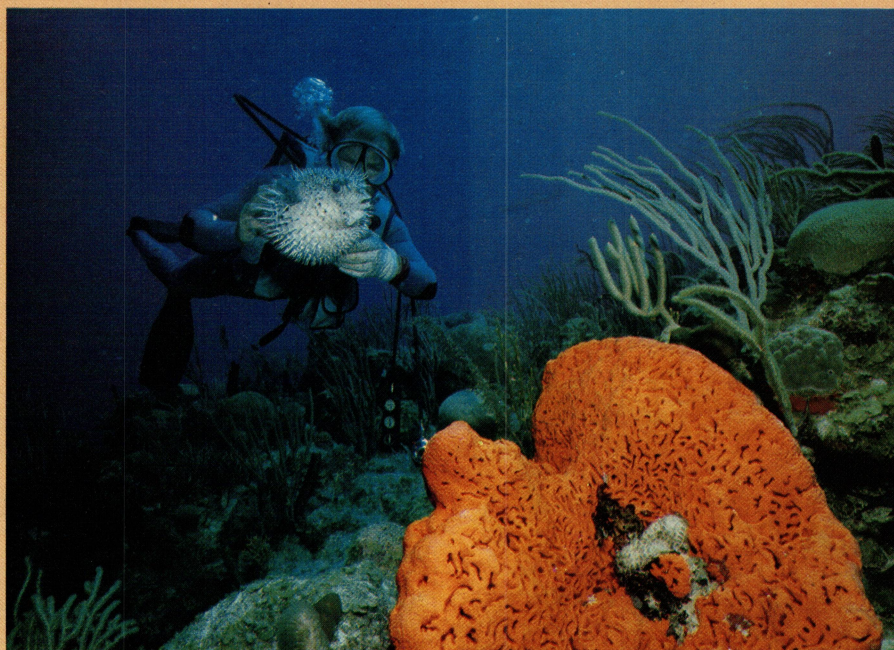
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Larry Angus, Green Cay Slope, St. Croix

ing the U.S. Virgins as a likely destination for your next vacation. One is the diving and the other is the shopping. While there are a number of other tropical pleasures to be experienced in this Caribbean paradise, none can compare with the enticing bargains available in the free port shops and stores. Because the U.S. Virgins are a United States territory, V.I. merchants enjoy a low tax status and are able to offer products for between 30 and 50 percent less than U.S. mainland prices. Items such as china, watches, foreign manufactured radios and calculators, hand-cut crystal and imported perfumes can be purchased at ridiculously low prices.

Perhaps the most impressive advantages to shopping in the U.S. Virgins is the fact that U.S. citizens can bring home twice as much merchandise tax free as they would be able to purchase in other overseas vacation islands. A U.S. Virgins shopper is allowed to return with \$600 worth of duty-free purchases, as long as these have been purchased in one of the three U.S. Virgin Islands. If you should want to purchase more than \$600 worth of items, the next \$600 is subject to a flat duty charge of five percent — still a bargain considering the heavy discounts involved.

The amount of discount depends on the type of items purchased. For example, you can buy gold and jewelry for discounts that range between 30 and 60 percent. Discounts on perfume or cosmetics run between 25 and 40 percent. Watches and clocks are generally offered at 30 to 40 percent discount. Crystal and china sell for 25 to 40 percent below retail. As one delighted shopper pointed out, you could probably do your entire Christmas shopping during one vacation trip, and the savings in dis-

counts would probably pay for at least one-half of the entire vacation trip!

Still another attractive advantage to shopping in the U.S. Virgins is that visitors may mail home gifts valued up to \$40 absolutely duty-free.

Liquor is perhaps one of the most popular free port shopping items on any Ca-



Green Cay Slope, St. Croix

ibbean island. While the normal custom restriction is one quart of liquor for returning U.S. residents, American citizens returning from the U.S. Virgins are allowed to bring back one full gallon (five-fifths) of liquor absolutely duty-free. Discounts on liquor can range anywhere from 30 to 40 percent for popular brands of scotch or gin to a surprising 60 percent for more

expensive rums, or liqueurs.

HOW TO GET THERE

The U.S. Virgins are probably one of the easiest island destinations to visit, since there are daily jet flights from a variety of American cities. Eastern Airlines offers non-stop jet service from Miami to St. Croix or from Miami to St. Thomas. They also have excellent connecting service (via Miami) with such major cities as Atlanta, Baltimore, Boston, Chicago, Cleveland, Detroit, New York, Los Angeles, and more than two dozen other cities in the U.S.

American Airlines offers non-stop jet service from both New York City and Washington, D.C. to St. Croix. They also have connecting inter-island flights which go on to St. Thomas. American also offers connecting jet service from all cities in the U.S. to St. Croix via New York gateway.

Because of the immense popularity of the U.S. Virgins as a vacation paradise, you may at times encounter difficulty in obtaining a reservation on a non-stop flight. Should this be a problem, you may want to investigate an alternate route via San Juan, Puerto Rico. Both Eastern Airlines and American Airlines schedule many more flights daily into San Juan than into the neighboring U.S. Virgins. You can obtain a quick and easy inter-island connection from San Juan to either



St. Croix

St. Croix or St. Thomas from several different commuter airline services. For example, Aero Virgin Islands operates frequent daily flights from San Juan to the U.S. Virgins. Prinair probably has the most number of daily flights from San Juan to the U.S. Virgins — there is usually a flight every half hour or so. Other carriers include Liat, Air Caribbean, Antilles

photo/Paul J. Tzimoulis

U.S. VIRGINS DIVE OPERATORS

ST. THOMAS

ST. CROIX

ST. JOHN

DIVE OPERATOR	PHYSICAL LOCATION	OWNER/MANAGER	DIVE GUIDES	U.S.V.I. PHONE	AIR COMPRESSOR	SCUBA TANKS
AQUA ACTION, INC.	Secret Harbour Hotel	Palmer Williams Mary Williams	Palmer Williams Mary Williams Rebecca J. Laub Monica Lehrer Brian Allen	(809) 775-3275	Mako 8 cfm/3000 psi Ingersoll Rand 10 cfm/3000 psi Bauer 8 cfm/3000 psi	104 steel
CARIBBEAN DIVERS	Across the street from the Red Hook ferry landing	Dave Fredebaugh	Dave Fredebaugh	(809) 775-1935	Ingersoll Rand 15 cfm/2400 psi	70 steel
THE DIVE LOCKER	Pier 4 at Johnny Harms Lagoon Marina	Diane Lambert Bill Jones	Bob Carney Mike Woodward	(809) 775-3110	Worthington 12 cfm/3000 psi	40 steel
ST. THOMAS DIVING CLUB AT BOLONGO BAY	Bolongo Bay	Dick Doumeng	Jeff Strickland Paula Selby Bill Kennedy	(809) 775-1800	Worthington 12 cfm/3000 psi Worthington 12 cfm/3000 psi	100 aluminum
ST. THOMAS DIVING CLUB AT VILLA OLGA	Villa Olga	Dick Doumeng Richard J. Doumeng	Armando Jenik George Kremer Pam Dickinson Bud James Carole James Andre Webber	(809) 774-1376	Mako 17 cfm/5000 psi Worthington 14 cfm/5000 psi	200 mixed
UNDERWATER SAFARIS OF ST. THOMAS	On the dock of the St. Thomas Hotel and Marina (formerly the Sheraton)	Tricia Luff	—	(809) 774-1350	Mako 15 cfm/5000 psi	100 aluminum
VENTURE 7, INC.	Water Island, St. Thomas Harbor	Tom Domin Ken Wolford	Tom Domin Ken Wolford	(809) 774-1213 (809) 774-2904	Worthington 50 cfm/5000 psi	75 aluminum
V.I. DIVING SCHOOLS/SUPPLIES, INC.	Long Bay Road across from St. Thomas Hotel and Marina (formerly the Sheraton)	Marvin Ellis Sue Leferson	Gerry Schuster Tracee Friestad Bob Berg Tom Pederson Kevin Hogan Dyan Martin John Cuccia Jack Lile David Vanzo	(809) 774-8687 (809) 774-TOUR	Mako 16 cfm/5000 psi Mako 16 cfm/5000 psi Mako 16 cfm/5000 psi	150 aluminum 72's 20 aluminum 50's
JOE VOGEL DIVING CO.	1) Sebastian's Restaurant Charlotte Amalie 2) Compass Pt. Marina	Joe Vogel Debby Powers-Vogel	Joe Vogel Debby Powers-Vogel Bill Burbank	(809) 774-2321 (809) 775-1610 (809) 775-4320	Worthington 17.5 cfm/5000 psi	40 steel
WATERSPORTS CENTER	1) Sapphire Beach Resort 2) Pineapple Beach Resort 3) Frenchman's Reef Resort 4) The Dock Shop, Cruz Bay	Gary Deering	Enrique Saludes Mike Davis Fred Williams Allan Brown	(809) 775-0755 (809) 774-8500 ext. 353	Mako 9.5 cfm/5000 psi Mako 4 cfm/3000 psi	100 steel
ABOVE AND BELOW, INC.	12 Strand Street Frederiksted Near the Pier	Ed Wendt	Ed Wendt	(809) 772-3701	Mako 8.5 cfm/5000 psi	62 steel
CARIBBEAN SEA ADVENTURES	1) 53 B Company Street 2) King Christian Hotel 3) Buccaneer Hotel 4) Grapetree Bay Hotel 5) Grapetree Beach Hotel	Larry Angus	Larry Angus Dale Williams Robert Butcher James Barth Jay Bolenberg Jimmy Clarkin	(809) 773-6011	Worthington 15 cfm/5000 psi Mako 8.5 cfm/3500 psi	100 mixed
CAY DIVERS	Hotel on the Cay Christiansted Harbor	Ron Cutler Hank Tonnemacher	Ron Cutler Hank Tonnemacher Cary Humphries	(809) 773-5907 (809) 773-2035 ext. 261	Mako 18 cfm/3500 psi	40 aluminum
NORTH STAR DIVE TOURS	Across the street from Cane Bay Beach	Buzz Chory	Buzz Chory Howard Wilson Janet Hutchinson	(809) 778-2125	Mako 9 cfm/3200 psi	24 steel
PRESSURE LTD.	Anchor Inn Dock, Christiansted Harbor	Brian Max Friedman Alan Behr	Brian Max Friedman Alan Behr Ward Galbreath	(809) 773-4837	Bauer 5 cfm/3000 psi Bauer 3.5 cfm/2500 psi	20 aluminum
SALTY DOGS, INC.	King's Wharf, Christiansted Harbor	Bibo Damioli	Bibo Damioli Tom Eimer Cris Ciro	(809) 773-2678	Mako 17 cfm/5000 psi Mako 5 cfm/5000 psi	90 mixed
V.I. DIVERS LTD.	Pan Am Pavilion Shopping Mall Christiansted Harbor	Bret Gilliam Lina Hitchcock	Bret Gilliam Tim LeRoux Michelle Pugh Matt Kennedy Kathy Boughman David Meade	(809) 773-6045	Mako 25 cfm/3300 psi Mako 9.2 cfm/3300 psi	100 aluminum
ST. JOHN WATERSPORTS	1) The Dive Shop Mongoose Junction Cruz Bay 2) Cinnamon Bay Waterworld Campground	Jack Bosh Stu Brown	Jack Bosh Tom Zierk Mike Bumba	(809) 776-6256	Mako 17 cfm/5000 psi Ingersoll Rand 15 cfm/2500 psi Ingersoll Rand 10 cfm/2500 psi	60 steel
SCUBA VENTURES LTD.	Caneel Bay Plantation	Jim Travers Scott Vallerga	Jim Travers Scott Vallerga	(809) 776-6111 Activities Desk	Ingersoll Rand 30 cfm/5000 psi	50 steel 15 aluminum

DIVE BOAT CAPACITY	DIVE DEPARTURES	NUMBER OF TANK DIVES	TYPES OF DIVING	DIVE AREAS	HOTEL PACKAGES	MAILING ADDRESS
39 ft. Matthews/12 divers 26 ft. Chris-Craft/6 divers 22 ft. Wellcraft/6 divers 26 ft. Pearson/4 divers	7:00 AM 7:30 AM 9:30 AM 1:30 PM 7:30 PM	Snorkel and 2 tank boat trip to Virgin Gorda 2 tank Rhone trip 1 tank boat trip 2 tank boat trip 1 tank boat trip 1 tank night dive	Wreck dives, cave and tunnel dives, snorkeling trips, shallow coral gardens, medium depth reefs, pinnacles, instruction, photo dives, night dives	North side island, east end islands, south side islands, Virgin Gorda, the Rhone, the Baths	Secret Harbour Morningstar Beach Hotel Sea Horse Cottages Watergate Villas	Aqua Action, Inc. Wintberg Peak St. Thomas U.S.V.I. 00801
20 ft. Bertram/6 divers	9:00 AM 1:00 PM 7:00 PM	1 tank boat trip Instruction or 2 tank boat trip 1 tank night dive	Wreck dives, U/W pinnacles, caves and tunnels, night dives, shallow coral gardens, medium depth reefs	North side islands, east end islands, south side islands, B.V.I.	Sea Horse Cottages	Caribbean Divers P.O. Box 93 Red Hook, St. Thomas U.S.V.I. 00801
40 ft. Lindsay/30 divers 21 ft. Mako/6 divers	8:00 AM 9:00 AM 1:30 PM 6:00 PM	2 tank Rhone trip 2 tank boat trip 1 tank boat trip 1 tank night dive	Wreck dives, caves and tunnels, shallow coral gardens, medium depth reefs, night dives, photo dives	Southside islands and wrecks, east end islands, north side islands, B.V.I.	Red Hook Mountain Apts. and Spa	The Dive Locker P.O. Box 51 Red Hook St. Thomas, U.S.V.I. 00801
25 ft. Delta Puma/12 divers	9:00 AM 9:00 AM 11:00 AM 2:30 PM 6:30 PM	2 tank boat trip 1 tank boat trip 1 tank beach dive 1 tank boat trip 1 tank night dive	Wreck dives, tunnels & caves, night dives, shallow coral gardens, offshore pinnacles, photo dives, medium depth coral reefs	South side, east end islands, south side islands, St. John reefs, Rhone wreck, north side islands	Bolongo Bay Beach and Tennis Club	St. Thomas Diving Club Bolongo Bay Beach & Tennis Club Bolongo Bay Road, St. Thomas U.S.V.I. 00801
42 ft. Lindsay/35 divers 25 ft. Delta Puma/14 divers 68 ft. Mohawk/20 divers	9:00 AM 2:00 PM 6:30 PM	2 tank boat trip 1 tank boat trip 1 tank night dive	Wreck dives, caves and tunnels, shallow coral gardens, medium depth reefs, night dives	West end, south side islands and wrecks, east end islands and cays	Villa Olga Island Beachcomber Virgin Isle Hotel Windward Passage Bluebeard's Castle St. Thomas Hotel and Marina Frenchman's Reef Limetree Beach Watergate Villas Bolongo Bay Beach Club Cowpet Villas	St. Thomas Diving Club at Villa Olga P.O. Box 4976 Charlotte Amalie, St. Thomas U.S.V.I. 00801
40 ft. Lindsay/30 divers 42 ft. Sportfisherman/6 divers 25 ft. Mako/6 divers	9:00 AM 2:00 PM 6:30 PM	1 tank boat trip 2 tank boat trip 1 tank boat trip 1 tank night dive	Snorkel trips, wreck dives, pinnacles, shallow coral gardens, cave and tunnel, medium depth reefs, night dives, photo dives	North, east and south side islands, B.V.I., Culebra, P.R.	St. Thomas Hotel and Marina All St. Thomas Hotels	Underwater Safaris P.O. Box 7970 St. Thomas U.S.V.I. 00801
43 ft. Chesapeake/37 divers	8:30 AM 1:30 PM 6:30 PM	2 tank boat dive 1 or 2 tank boat dive 1 tank night dive	Wreck dives, shallow and medium depth reefs, beach diving, pier diving, photo dives, night dives, tunnels	West and south side islands and cays, Rhone wreck	Sugar Bird Beach Hotel and Tennis Club	Venture 7, Inc. P.O. Box 3358 Water Island, St. Thomas U.S.V.I. 00801
34 ft. Buccaneer Sloop/6 divers	6:30 AM 9:00 AM 9:15 AM 9:30 AM 1:00 PM 1:30 PM 6:00 PM	1 tank beach dive 1 tank Scuba Adventure 2 tank ScubaSail 1 or 2 tank beach dive 1 tank Scuba Adventure 1 or 2 tank beach dive 1 tank night dive	Wreck dives, beach dives, shallow coral gardens, medium depth reefs, night dives	North side beach sites, south side beaches and islands	All St. Thomas Hotels	Virgin Islands Diving Schools/Supplies, Inc. P.O. Box 9707 Charlotte Amalie, St. Thomas U.S.V.I. 00801
31 ft. Bertram/6 divers for Rhone wreck trips	6:30 AM 12:00 PM 3:30 PM 6:30 PM	1 tank beach dive 1 tank beach dive 1 tank beach dive 1 tank night dive	Beach dives—beginner to expert, anchor dives, night dives, wreck dives, photo dives	North, south and east shore beaches, Rhone wreck dives	The Treehouse All St. Thomas Hotels	Joe Vogel Diving Company P.O. Box 7322 Charlotte Amalie, St. Thomas U.S.V.I. 00801
32 ft. Thomas/6 divers 26 ft. Chris-Craft/6 divers 21 ft. Seabird/5 divers 21 ft. Seabird/5 divers 21 ft. Deck-Craft/6 divers	8:00 AM 9:30 AM 1:30 PM 7:30 PM	2 tank Rhone dive 1 tank boat trip 2 tank boat trip 1 tank boat trip 1 tank night dive	Wreck dives, tunnels and caves, night dives, shallow coral gardens, medium depth reefs, offshore pinnacles, photo dives	North side islands and wrecks, east end islands, south side islands and wrecks, St. John reefs, B.V.I.	Sapphire Beach Resort Sapphire Condos West Pineapple Beach Resort Bluebeard's Castle	Watersports Center P.O. Box 2432 Charlotte Amalie, St. Thomas U.S.V.I. 00801
23 ft. Robalo/6 divers	10:00 AM 2:00 PM 8:00 PM	1 or 2 tank boat trip 1 or 2 tank boat trip 1 tank night dive	Pier dives, wall dives, photo dives, bottle dives, night dives, medium depth reef dives	South shore and west side of St. Croix from Hams Bluff to Sandy Point	All Frederiksted hotels	Above and Below, Inc. 12 Strand Street Frederiksted, St. Croix U.S.V.I. 00840
37 ft. Striker/6 divers 36 ft. Harris/23 divers 27 ft. Lindsay/20 divers 22 ft. Seaspray/6 divers 21 ft. Grady White/6 divers	7:00 AM 9:00 AM 2:00 PM 6:30 PM	2 tank Rhone trip 2 tank boat trip 1 tank boat trip 1 tank night dive	U/W park dives, wall dives, snorkeling trips, pier dives, pinnacles, caves and tunnels, medium depth reefs, wrecks, photo dives	Buck Island U/W Park, Long Reef, north coast drop-offs, Lang Bank, Seven Mile Reef, B.V.I.	Buccaneer Hotel King Christian Hotel Grapetree Bay Hotel Grapetree Beach Hotel	Caribbean Sea Adventures P.O. Box 3015 Christiansted, St. Croix U.S.V.I. 00820
40 ft. custom/18 divers 26 ft. twin outboard/6 divers 25 ft. Mako/6 divers	9:30 AM 1:30 PM 6:30 PM	1 tank boat trip 2 tank boat trip 1 tank boat trip 2 tank boat trip 1 tank night dive	Snorkeling, U/W park tours, wall dives, night dives, pier dives, shallow and medium depth coral gardens, Rhone, Hydrolab, photo dives	Cane Bay & Salt River walls Buck Island, Frederiksted Pier, Scotch Bank, Long Reef, B.V.I., secret spots	Hotel on the Cay	Cay Divers P.O. Box 3234 Christiansted, St. Croix U.S.V.I. 00820
Beach dives only	9:00 AM 1:00 PM 8:00 PM	1 or 2 tank beach dives 1 tank beach dive 1 tank night dive	Wall dives, shallow coral gardens, pier dives, night dives, anchor dives, Hydrolab, DPV dives	North coast drop-offs from Cane Bay to Davis Bay, Hydrolab, Frederiksted Pier	Ox Mill Cottages Cane Bay Reef Club Cane Bay Plantation North Star Cottages Waves at Cane Bay	North Star Dive Tours P.O. Box 3461 Christiansted, St. Croix U.S.V.I. 00820
22 ft. Aquasport/6 passengers	9:30 AM 2:30 PM 6:30 PM	2 tank boat trip 1 tank boat trip 1 tank night dive	Wall dives, medium depth reefs, shallow coral gardens, night dives, pier dives, wreck dives	North coast drop-offs, Buck Island U/W Park, Long Reef, Scotch Bank, Frederiksted Pier	Anchor Inn Caravelle Hotel King's Alley St. Croix By the Sea	Pressure Ltd. P.O. Box 3612 Christiansted, St. Croix U.S.V.I. 00820
55 ft. Italian trawler/6 divers 17 ft. Custom/30 divers 9 ft. Mako/6 divers	9:00 AM 1:30 PM 6:00 PM	2 tank boat trip 1 tank boat trip 2 tank boat trip 1 tank night dive	U/W park tours, snorkeling trips, wall dives, shallow and medium depth reefs, pinnacles, caves and tunnels, wreck and night dives	Buck Island, U/W Park, north coast drop-offs, Long Reef, Lang Bank, B.V.I.	King Christian Reef Condominiums Gentle Winds	Salty Dogs, Inc. 59 King's Wharf Christiansted, St. Croix U.S.V.I. 00820
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11 ft. Custom/6 divers 10 ft. Pacemaker/6 divers 2 ft. Aquasport/6 divers 10 ft. Shamrock/6 divers	9:00 AM 10:00 AM 2:00 PM 7:00 PM	2 tank Rhone trip 1 tank boat trip 2 tank boat trip 1 tank boat trip 1 tank night dive	Medium depth reefs, caves and tunnels, shallow coral gardens, night dives, wreck dives, photo dives	North side islands, south side reefs, B.V.I.	Cinnamon Bay Campgrounds Gallows Point Resort Serendip Hotel Estate Zootenvaal	St. John Watersports P.O. Box 70 Cruz Bay, St. John U.S.V.I. 00830
2 ft. Aquasport/6 divers 5 ft. Single diesel/6 divers 5 ft. Twin diesel/20 divers	8:00 AM 8:30 AM 10:30 AM 1:30 PM 2:00 PM 9:00 PM	2 or 3 tank Rhone trip 2 tank boat trip 1 tank boat trip 1 tank boat trip 2 tank resort instruction 1 tank night dive	Medium depth reefs, shallow coral gardens, wreck dives, night dives, tunnels and caves, instruction	North side islands and cays, south side islands, B.V.I.	Caneel Bay Plantation	Scuba Ventures, Ltd. Caneel Bay Plantation St. John U.S.V.I. 00830



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Air Boats, and Air BVI. For California travelers, I found Eastern's "red-eye" special to be the fastest and simplest way to reach the U.S. Virgins. This flight departs Los Angeles late in the evening with one stop in Miami and onward to San Juan. A quick connection with one of the island carriers, such as Prinair, will deliver you into the U.S. Virgins by mid-afternoon, thus eliminating any overnight layovers along the way.

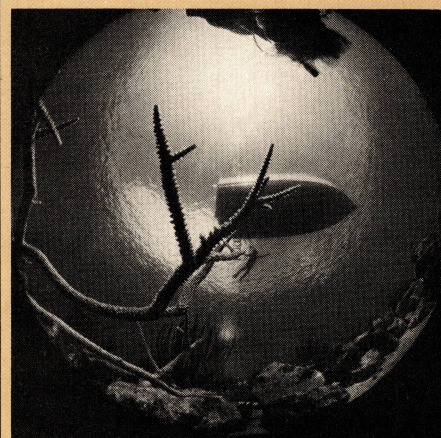
Once you are in the U.S. Virgins, travel between the various islands is quite simple and convenient. You can fly between St. Thomas and St. Croix on a variety of different inter-island carriers.

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you prefer more direct travel, you may want to consider flying from St. Thomas Harbor to Christiansted Harbour via Antilles Air Boat which actually lands in the water. Travel between St. Thomas and St. John is limited to a high speed ferry-boat which departs from either St.

Thomas Harbor or Red Hook and docks at Cruz Bay Landing. These trips are so convenient that many visitors will travel to a neighboring island for just a day of sightseeing and return to their hotel by late afternoon.



St. Thomas

If there is any one thing to be said of the U.S. Virgins, it is that the whole is greater than any of the individual parts. To fully appreciate and enjoy the U.S. Virgins, a visiting diver must plan to spend enough time to properly sample this smorgasbord of scuba experiences. A long weekend just won't do it. One needs to plan at least a 10 to 14 day trip for sufficient time to dive the walls of St. Croix, explore the wrecks of St. Thomas, and thrill to the wonders of big fish action which can be found among the offshore islands and cays. It is this wide spectrum of dive experiences which make the U.S. Virgins truly unique among the islands of the Caribbean.

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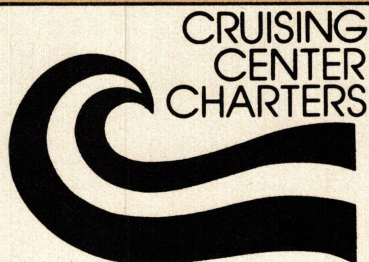
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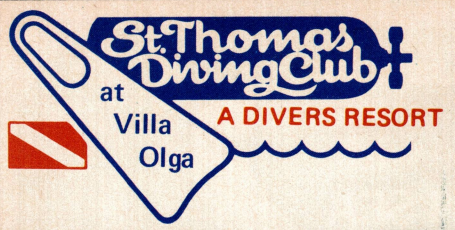
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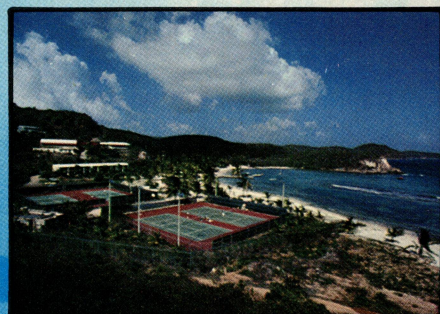


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And what a world it is! The St. Thomas Diving Club is run by divers for divers. Our facilities include the moderately priced Villa Olga Hotel, headquarters for the Diving Club; and the Island's leading beach resort, Bolongo Bay Beach & Tennis Club. Both offer complete convenient dockside facilities including boats, dive shop and rental centers. We dive everyday, at least 3 tanks a day, on time and to a variety of dive sites that will please the most demanding. We don't mix experienced divers with novice divers and we don't cancel. Our fleet of all new boats and vehicles is dependable as are our new compressors and U.S. Divers equipment. If mechanical failures occur, we have the back up resources to operate. We know we have 365 days a year of Virgin Islands diving, but you may only have 7 days. We promise not to waste one of your days.



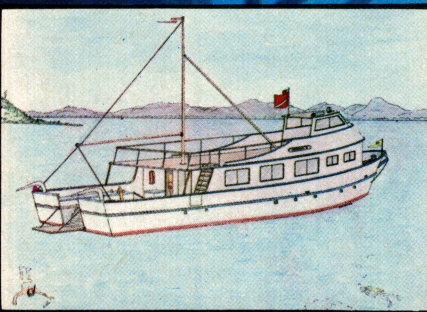
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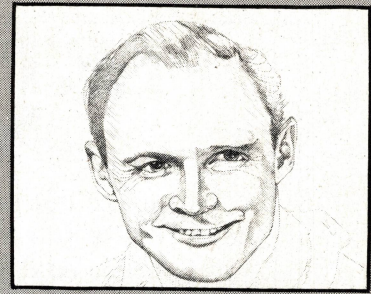
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Technifacts

BY E.R. CROSS



Because Technifacts is designed to be a source of information for commercial divers, it is necessary to devote some columns to answering reader questions. This Technifacts is for that purpose.

RADIOACTIVE WATERS

Technifacts has received a lot of interesting, and some unusual, letters in the past few months. One letter that, on first reading, startled me more than any other was received in early October. The reader wrote, "My wife and I are senior health physics technicians and we contract out to various nuclear plants during plant outages. Our main job is to control the radiation, radiation contamination, radioactive airborne contamination, and to prevent workers in other fields from being exposed to radiation. There are several bodies of water in nuclear power plants, the spent fuel pit and the reactor cavity being the two largest. At various times, divers are required to make repairs in some of these systems. My question is, where can we get the training to become qualified to work in reactor plants so that we may diversify our present nuclear field?"

This letter should not have startled me as much as it did because commercial divers regularly work in bodies of water inside chemical plants, refineries and other industrial complexes. Also, I had occasion to dive for several months in radioactive waters during the first and second atom bomb tests at Bikini Atoll in July, 1946. Following the underwater blast, radioactivity was much worse than anticipated and special decontamination procedures were necessary for all personnel, but particularly for the divers.

Because of the increased number of nuclear plants and the resulting job opportunities for specially trained and equipped commercial divers, there may be more than one commercial dive company working in nuclear plants in the United States. However, I know of only one. You might try writing to Bob Shourot, President, The Coastal Group, 108 W. Main Street, Bay Shore, NY 11706. The Coastal Group has a subsidiary called Nuclear Reactor Dive Systems. It also operates the Coastal Diving Academy.

COMMERCIAL DIVE EQUIPMENT

"I am elated to find you getting into commercial diving in Technifacts. My brother and I have wanted to write SKIN DIVER about our commercial diving questions; here they are. Where can we get a Victor underwater cutting torch? Where can we obtain plans for a good, home-built submersible? How about a breakdown on underwater cutting of steel structures? What's the difference between a Victor 2900 and 3900 cutting torch? How deep can these torches be used? How about some information on underwater welding? Where can we buy underwater tools such as saws, jackhammers, etc.? Anxiously awaiting your next Technifacts."

I haven't seen a Victor underwater, oxy-hydrogen cutting torch for several years. If the factory doesn't have them in stock they may no longer be available. However, if it is necessary to use a gas torch, these are available from other manufacturers (see below for source). Information on underwater cutting and welding will be covered in a future Technifacts. A fairly complete line of underwater hydraulic power tools is manufactured by Stanley Tools, 3810 SE Naef Road, Milwaukie, OR 97222. Tools available include a hydraulic chipping hammer, three sizes of cut-off saws, a chain saw, a grinder, a hammer drill, a drill, six sizes of impact wrenches, a scaler and underwater pumps.

For a one-stop source of tools and other supplies for the commercial diver, including underwater oxy-hydrogen cutting torches and supplies, write to M&E Marine Supply, P.O. Box 601, Camden, NJ 08101. This company stocks the complete line of Stanley hydraulic tools listed above, plus most everything else a commercial diver might need — including three models of oxy-electric cutting torches, cutting rods for these torches, jetting nozzles, float bags of various sizes, communication systems, underwater TV systems, cameras, etc. Send \$2 to M&E for their catalog.

COMPRESSORS

A commercial diver wrote requesting information on the availability of equipment needed to set up an air filling sta-

tion. His reason, "It is quite expensive to get tanks filled in the area where I live."

For most sport divers and some commercial divers, it is less expensive to have a dive shop fill dive tanks than to own a compressor and the related equipment needed to operate a filling system. Also, if any air is to be sold to other divers, it must meet rigid minimum specifications of purity, moisture, etc. Minimum total cost for an outfit to fill a standard scuba tank in 30 minutes or so would be in the neighborhood of \$2,000. Larger units for filling at a rate of about 10 cfm could cost as much as \$10,000. Annual maintenance, utilities, equipment, depreciation, etc., could easily make operating such a system so costly that it is not economically feasible.

Also, dive shop compressors are usually better maintained and operated than home units. Finally, for commercial divers using a fairly large number of fills per day the dive shop usually offers special rates.

When cost is not a factor and a personal air compressor is a must in order to complete a job, there are many sizes and types available. Several were advertised in the October issue of SKIN DIVER: Bauer Breathing Air, 1328 Azalea Garden Road, Norfolk, VA 23502; Mako Compressors Inc., 1634 SW 17th Street, P.O. Drawer 1630, Ocala, FL 32670; and Bristol Pneumatic Limited, Lodge Causeway, Bristol BS16 3JS England. Also, M&E Marine Supply mentioned previously stocks most of the above models plus parts, etc., for building a filling station.

COMPOSITE AIR CYLINDERS

A reader in Rockville, MD wrote asking, "What is your opinion on the use of composite high-pressure vessels for diving?"

Basically, a composite high-pressure vessel would be a diving cylinder made by winding S-2 fiberglass over a seamless aluminum liner. Pound for pound of cylinder weight, the air capacity of the composite cylinder would be about twice that of a steel cylinder.

Filament wound vessels for compressed gases, including air, have made inroads into the steel cylinder market in

(Continued on page 114)

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Scuba Quiz

Category: Vertigo

By Dennis Graver

The underwater world is a beautiful place — unless it is spinning around you. As you may know, there are many causes of vertigo or dizziness in diving. It is important to know these causes, as well as their effects, and how to deal with them. Test your knowledge of vertigo with the following questions. Answers are on the next page.

1. A diver can experience vertigo underwater while:

- ☐ A. Descending
- ☐ B. On the bottom
- ☐ C. Ascending
- ☐ D. Any of the above

2. Vertigo following the rupture of an eardrum is most likely due to:

- ☐ A. Air escaping from the middle ear
- ☐ B. The sudden pressure increase in the middle ear
- ☐ C. The change in temperature in the middle ear
- ☐ D. None of the above

3. Vertigo occurring during ascent would most likely be caused by:

- ☐ A. Decompression sickness
- ☐ B. A reverse block that suddenly clears
- ☐ C. Reduction of carbon dioxide partial pressure
- ☐ D. A "trapdoor" effect on the eustachian tube

4. Which of the following positions is most likely to result in vertigo when descending:

- ☐ A. Diver vertical with the head up
- ☐ B. Diver vertical with the feet up
- ☐ C. Diver in 30 degree head-down position
- ☐ D. The position of the diver makes no difference

5. Select the appropriate action to take if vertigo occurs while diving:

- ☐ A. Swim to the surface and rest
- ☐ B. Assume a head-down position
- ☐ C. Grasp a stationary object until vertigo subsides
- ☐ D. Ascend a few feet and equalize pressure in the ears

6. During a dive to 100 feet in cold, dirty water, divers could be affected by vertigo caused by:

- ☐ A. Sensory deprivation
- ☐ B. Nitrogen narcosis
- ☐ C. Caloric stimulation
- ☐ D. All of the above

7. In addition to temperature and pressure induced vertigo, the ailment could also result from:

- ☐ A. Motion sickness
- ☐ B. Impure air
- ☐ C. Excess ear wax
- ☐ D. All of the above

8. Vertigo caused by decompression sickness results from:

- ☐ A. Bubbles in the semi-circular canals of the ear
- ☐ B. Bubbles in the cochlea of the ear
- ☐ C. Bubbles in the auditory nerves of the ear
- ☐ D. Rupture of the round window in the cochlea

9. Vertigo occurs most frequently in diving:

- ☐ A. From ruptured eardrums
- ☐ B. From unequal auto-inflation
- ☐ C. From unequal ear pressures during ascent
- ☐ D. From unequal temperatures in the ears

10. Select the most correct answer for vertigo that reoccurs frequently or is prolonged while diving:

- ☐ A. Discontinue diving as a sport
- ☐ B. See an ear specialist
- ☐ C. Only dive with people aware of your problem
- ☐ D. Use vertigo suppressing medication

Scuba Quiz

Answers: Vertigo

1. D. Any of the above. In the answers to the other questions you will see that vertigo can be caused by pressure or temperature differences in the ears, and by decompression sickness, disorientation, carbon monoxide toxicity, narcosis and even body position. One or more of the causes can result in vertigo at any point in a dive.

2. C. The change in temperature in the middle ear. In general, the organs of balance in the ears need to be in equilibrium with respect to temperature and pressure or vertigo will occur. Cold water entering an ear through a ruptured eardrum upsets the balance and causes the vertigo. The feeling will pass once the water has warmed and equilibrium between the ears is restored.

3. B. A reverse block that suddenly clears. Sudden pressure changes in one ear can produce vertigo. This can occur from difficulty with equalization during descent or from the sudden release of pressure in an ear during ascent. Be sensitive to pressure differences in the ears. Ascend and descend slowly and keep the ears clear and balanced.

4. C. Diver in 30 degree head-down position. The three semi-circular canals in the ear provide reference information to the brain. In a 30 degree head-down position, the canal that provides horizontal reference information is placed in a vertical position and can cause vertigo — especially when other senses are deprived of normal reference information. This is just one more reason why feet-first descents are preferred.

5. C. Grasp a stationary object until vertigo subsides. Stay put. Divers have swum down or sideways thinking they were going to the surface. Most cases of vertigo are temporary. Hold a solid object for reference until control is regained. If in mid-water, hug yourself for some relief until the dizziness passes.

6. D. All of the above. Without gravity or visual reference, vertigo can occur even if there are no problems with the ears. Use a descent line for reference in turbid water. Narcosis-caused vertigo can be avoided or corrected with shallower depths. Water entering the ears needs to do so simultaneously and at equal temperatures. Take care with hoods and ear wax buildup.

7. D. All of the above. Dizziness is a symptom of many ailments, seasickness among them. Some non-prescription medications can safely and effectively control motion sickness. Carbon monoxide poisoning is another cause of vertigo. Use a reputable air source. If bothered by excess ear wax clogging the ear canal, ask your druggist for a solution to reduce the wax accumulation.

8. A. Bubbles in the semi-circular canals of the ear. These fluid-filled canals provide reference information for equilibrium. Bubbles formed within the fluid of the canals interfere with normal function and cause what is referred to as the staggers. Prolonged vertigo following a dive may indicate a bends problem and appropriate assistance should be sought.

9. C. From unequal pressures during ascent. According to a study by Lundgren (1965), most divers complained of vertigo during ascent. Further investigation revealed that nearly all of the difficulty resulted from alternobaric vertigo, or dizziness from pressure changes within the ears. It is wise to ascend slowly on a reference line whenever possible.

10. B. See an ear specialist. Explain that you are a diver and make sure the physician understands the effects of pressure. Ideally, the physician should be a diver. Medical attention may correct your problem. Avoid diving until vertigo can be prevented. Disorientation underwater can be hazardous.

Don't be frightened by all of this information on vertigo. As with all dive maladies, understanding the topic and how to deal with it can prevent difficulty. By learning more about vertigo you should be better prepared to keep the underwater world from becoming topsy-turvy. Perhaps you will be a little less dizzy as a result of the information presented!

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Joe D. Taylor, Jr.
April 10, 1979

"I wish to thank all of you for the opportunity to have learned from you and gain from the value of your experiences. This has been an extremely enjoyable period of my life and one that I will remember fondly for years to come."

Theodore L. Williams
June 19, 1979

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Donald B. Cook
Sept. 26, 1979

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Richard P. Kaminsky
June 8, 1979

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March 19, 1979

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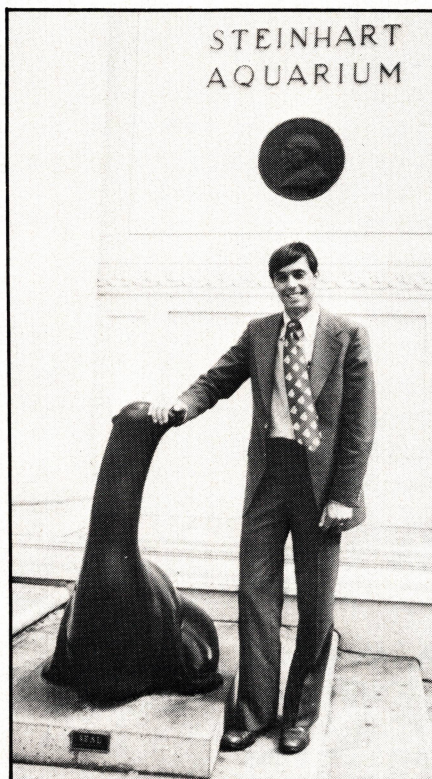
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JOHN MCCOSKER

John McCosker was a pre-med student at Occidental College, California, when he made his first scuba dive. That was in 1964. He had been asked to collect fishes for a Dr. John Stephens, who needed them for a research program. Stephens gave the 19-year old McCosker some advice: "You don't want to be a doctor, you'll just be rich and unhappy. You should not only work for a living, you should also live." With that, McCosker jumped into the chilly ocean off the old Marineland Pier in Palos Verdes, and his life changed. He left Occidental, enrolled at Scripps, and studied to become a research biologist. He stayed at Scripps until 1970, then went down to the Smithsonian Tropical Research Institute in Panama to work on the Sea Level Canal Project. He returned to Scripps to receive his Ph.D. (in eel evolution) and branched out into fish behavior. In 1973, at age 27, he came to the Steinhart Aquarium of San Francisco to become superintendent, replacing Earl Herald, who had drowned in a tragic accident. Today McCosker, a youthful 34, is not only director of the Steinhart Aquarium, but is director of public programs for the neighboring California Academy of Sciences.

When you meet McCosker you are struck with his boyish good looks and wry sense of humor. At first I thought I had been ushered into the wrong office because McCosker looked far too young to have accomplished so much. But it wasn't long before it became obvious as to why McCosker has achieved so much in such a short time. During the few hours of the interview McCosker's office was like a three-ring circus. First the telephone rang. "Some guy wants to sell me a 12 inch thresher shark," he says to the person on the other end, "What's the smallest one you've ever heard of?" The secretary comes in with a stack of letters that have poured in from people both praising and cursing him for capturing, exhibiting and subsequently releasing a great white shark. ("The next person who gets mauled or killed by a white shark will always be in my mind; the one your bloody organization released," said one. Another offered this: "For Christ's sake, give her (the



photo/Jack C. Stewart

shark) a break! Before it's too late.") The telephone rang again and McCosker speaks: "Hubbs Sea World Institute wants a white shark, so they can study the immunity of white sharks to cancer. I tell you, they're trying to one-up me, and I don't take lightly to that." He laughs. The voice on the other end says something, and McCosker comes back with, "It's simple. White sharks haven't learned to smoke cigarettes yet." He laughs again, hangs up. The interview proceeds and then there's another interruption. Someone comes in and says the temperature read out on the solar panel isn't working quite right. What to do? After all, Mayor Feinstein is arriving the next day to see the thing, and all the press will be there. John gives orders. The man leaves. Then, a news cameraman arrives from a local station that can't be there the next day with the mayor. Would McCosker mind walking around the solar panels while he films? "Come on," McCosker says, "Let's go

take a hike." The interview continues on the roof of the aquarium while we look at his solar panels and are filmed. On the way back to his office we pet the porpoises and a few other friendly fishes. Then John demonstrates how alligator gars get rowdy: He takes a mouthful of water from a nearby hose and spits at the animal ("Don't tell anyone I did this," he says). The alligator gar, thinking it's getting something to eat, rises up out of the water like lightning and smashes down so violently we are covered with water. John laughs.

That's how the entire interview went. With all that goes on around that place, one cannot help but be impressed with the fact that John McCosker is able to keep himself and Steinhart Aquarium together — which he does well — while at the same time making significant and important findings in the scientific undersea world.

SDM: I'd like to talk about the white shark you recently had in captivity at Steinhart. I was told that you came up with a theory, that a shark attack is possibly the way in which a shark stops an unpleasant electric discharge of some sort.

MCCOSKER: Yes. I had a unique and incredible opportunity last January/February to go with Al Giddings to Australia while he was filming *Mysteries of the Sea*. I brought along Tim Tricas, previously a student of Don Nelson, Long Beach, who focuses on interesting shark behavior. We went to South Australia, really not knowing what we were going to find — the time was so short. We had to put together a package of very simple scientific questions, not knowing what we were going to run into. But out of all this Tim and I, I think, came up with one of the most significant discoveries in all of white shark biology. The question is, why is the white shark such a maniacal, crazed animal — far beyond any other fish in the ocean? I mean, how can you write a book/movie like *JAWS* and draw such a crowd? The reason is because the animal has a history of attacking *everything* — from boats, propellers, motors, people, license plates on cars, beer cans — all of the objects that we, as a logical species, would say don't make sense. Why does it do that? And so Tim and I observed it at

in search of the strange and bizarre

by hillary hauser

water with a white shark to understand what the white shark does for a living. It cruises around the sea, sometimes at the surface, sometimes at 60 feet, usually in the vicinity of a pod of seals — elephant seals, southern fur seals, California seals, harbor seals, sea otters, and so on. The shark looks upward for a silhouette — like a seal catching its breath, or an abalone diver catching his breath — and takes a dead run at it. It really can accelerate fast — that's the shark's hy-

detect the presence of a pulsing, electric discharging body. It is feeling with its snout and sensing its location electrically. So Tim and I are down in this cage in Australia and this shark comes smashing in and instead of biting the piece of meat that it was aiming for — a few body-lengths away — boy, just as it comes in, it senses not the meat — which is not discharging because it's a dead piece of meat — but the cage itself. And it senses the boat — although it's a wooden-hulled boat there's lots of metal on the underside. So it grabs and shakes the cage. No wonder people think the shark is a maniac. "Why can't it just eat food? Why does it eat the cage?" Very simple. At close range it responds to the electrical discharge.

SDM: The shark you had in captivity at Steinhart — wasn't it an electrical discharge that caused the problems there?

McCOSKER: We had a white shark in the Roundabout and it was swimming around. It was marvelous, fantastic, except every now and then it would swim by a little portion of the tank, (a 360 degree doughnut fish tank) and bash its head in a feeding response. This was because there was a weak electrical discharge being emitted there.

SDM: The weak discharge triggered a feeding response . . .

McCOSKER: Yes, essentially it tried to eat the tank. Bashed into the tank and would go into this rather curious head-swinging behavior. The charge was so little that a diver without a wetsuit wouldn't feel it — which was me on several occasions. I got in when we were trying to keep the shark going — the other fish didn't respond to the electricity, but other fish are not as electro-sensitive. They're mostly visual in their sensitivity. So, in this rather sad and tragic bit of aquarium history we have a first live shark — a great white — that would have survived continuously in captivity were it not for this electric discharge.

SDM: But in a sense it just backed up what you had learned in Australia.

McCOSKER: Yes, so much the better. In that sense what we learned was incredibly valuable. What it means is if you don't want to be eaten, don't carry a battery in your pocket. Maybe it also means that the old suggestions about sharks and survival in the old Navy downed pilots manual are not so wrong, i.e., "If you see a white shark attacking, don't be frightened, swim naturally away from it, hit it on the nose." At least you'd have the satisfaction of knowing you did the right thing.

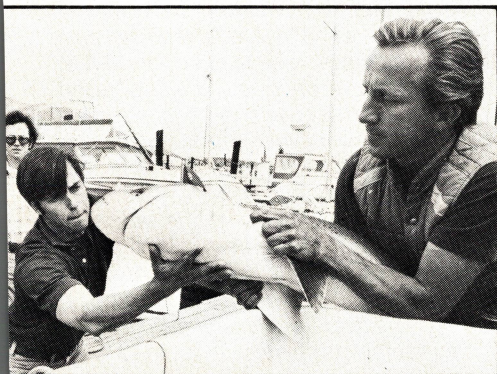
SDM: You mean, hitting it on the nose?

McCOSKER: On the underside of the snout is something similar to a five o'clock shadow. You turn a shark over, particularly a white shark, or a mako, and you see all these little ampullae. What a great opportunity we had, to take advantage of observing this fish in captivity.

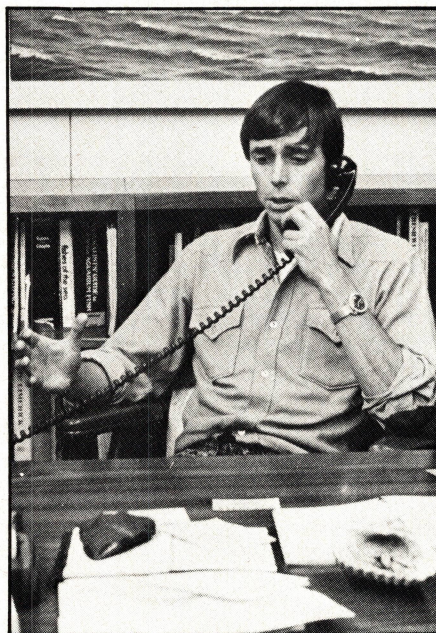
The many moods of John McCosker, director of the Steinhart Aquarium, San Francisco, CA. Far left, posing before the Steinhart facade; left, discussing Steinhart operations; left below, in the field; below, in his office.



photo/courtesy Steinhart Aquarium



photo/Jack C. Stewart



photo/courtesy Steinhart Aquarium

tacking the propeller, attacking the zincs on the underside of the boat. Tim and I in the cage, with Al filming from another cage, watched this huge fish come in at full torque, charge at a piece of horsemeat tied to the end of the cage, then turn and bite the cage, turn and bite the rudder, bite the propeller, the zincs — bite metal. We couldn't figure out whether it preferred those to the two of us inside the cage, or to the horsemeat hanging from the side of the cage. Maybe it was manic, maybe it was flossing — we didn't know what it was doing.

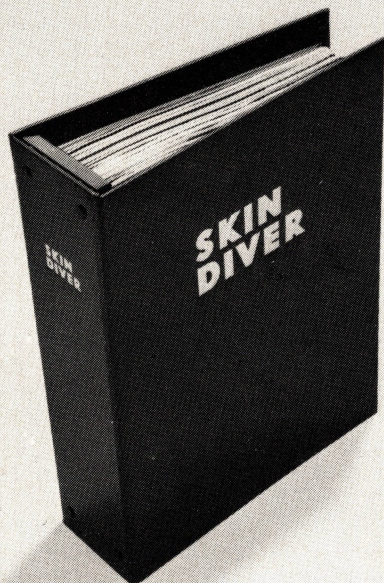
After thinking about it awhile, a great light bulb flashed over our heads. Those animals, at very close range, can't see what they're biting. They rush in, throw their snout up, extend their jaws outward like a set of false teeth, literally throw them out! *Mysteries of the Sea* showed this in slow motion. As the shark takes a bite, its eyes roll backward, obviously to protect its eye. This is its normal feeding behavior. What you have to do is be in the

hydrodynamic makeup. If you look at a shark you'll notice it's really built for speed, also comfort — very high acceleration. It can't maintain much speed, but for six to ten body lengths it can really move. It sees its prey at the surface, gives a couple of very strong turns of the tail, and *whoosh*, like a Polaris missile heading into space, it tries to hit this thing, doing it all on vision, at close range. And then, when it's about a half a body length away, it can't see. It's turned its snout up, thrown its teeth out and rolled its eyes back so it can't see.

SDM: It's the struggling at the surface that attracts the shark?

McCOSKER: What happens is this: The seal struggles at the surface, the ab diver struggles to hyperventilate for his next dive, and in both cases they are releasing an electrical discharge. At close range this is felt by the shark on the underside of its snout. The shark has electro-detectors called ampullae of Lorenzini and they, at very close range, can

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SD-181

MCCOSKER

SDM: Could you have completed more experiments with the electric theory if you could have kept the shark?

MCCOSKER: Sure. Would have, too. But, we'll get another one, put it in the tank, feed it, observe it; we'll put dummies in the tank with black wetsuits, yellow wetsuits, striped wetsuits and see how sharks react to different colored wetsuits, see whether it's time of day, see what it is about white sharks that causes them to attack. No one knows why white sharks bite divers. They don't eat divers; they bite them and spit them out. Maybe we can find out what's so repugnant about divers that white sharks don't want to eat them.

You know, in the history of diving 47 divers in California and Oregon have been bitten since 1927. Although 47 have been bitten by white sharks and other sharks, none have died from being eaten. Four people have died from traumatic blood loss, but they weren't eaten. The only way we're ever going to understand why sharks bite people is to have them in a controlled, experimental situation, and from that, hopefully, we can come up with a way to convince sharks not to bite people.

SDM: Are you aware that you have a reputation for going after the strange and bizarre — Clyde Beatty style?

MCCOSKER: I find classical ichthyology boring for the most part. I haven't set up an expedition for the Loch Ness Monster or the Yaqui Big Foot, but I'm very interested in white sharks.

SDM: What about the coelacanth?

MCCOSKER: Now there's a marvelous creature. I put together a team of biologists, photographers — Chuck Nicklin, Al Giddings and Sylvia Earle, and we set out in 1974-1975 to find it. Here's a fish that had been thought to be extinct for 80 million years and then one is caught in 1938 and my God, it's back from extinction. Everybody still thought this was the missing link.

But, we learned that sharks and coelacanths are closely related, and that coelacanths are not ancestors to the frogs, they aren't fish that crawled out of the water and became petrified, as was previously thought. Our coelacanth paper was very controversial, really raised a lot of hackles, but it's been accepted. This is a real breakthrough in coelacanth biology because we point out that coelacanths are *not* missing links, but are in fact shark relatives. This really turned the fish world upside down. At first it was unacceptable. Subsequently, it's been very well accepted. It's unfortunate in one respect because I would have loved to have come up with a discovery as exciting as a missing link, but in fact we debunked the missing link theory.

SDM: What about your work with flashlight fishes?

MCCOSKER: In 1975, I went out to set up the coelacanth trip to the Comores. While I was there I met a French veterinarian who was a marine biologist, and he said no one knows anything about this fish he called *le petit Peugeot*. I said, "What is that?" He said, "The little fish that is like a car. It drives around on the reef but only when there's no moon. And it comes around with its little light and it can see in front of it." So we dived to 60 feet one night and later to 230 feet, and saw and brought back flashlight fish. Prior to that expedition flashlight fish weren't known from the Indian Ocean. Biologists had never seen a flashlight fish except in an area near Indonesia where they had seen some, and in the Red Sea where a couple were seen. And so we went down, captured them, studied them, brought them back and for the first time ever, put them in the aquarium and turned about a million and a half people a year on to what it's like in the deep sea. All you see is green light. That was pretty exciting.

SDM: I'd like to ask about the work you did in relation to the Panama Canal.

MCCOSKER: Great opportunity. I published a paper that was really a warning. The present canal has a freshwater barrier, an elevated lock system, and what they wanted to do was dig a big, open trench. What happens to an ocean that has been evolving with predator/prey responses for over a millennium and is suddenly disjointed by man's greatest experiment in the history of the world — opening the canal and mixing two oceans? Caribbean corals are considerably different in structure from Pacific corals. These are really a response to environmental conditions — surge, wind and waves, maximizing available light, and worrying about predators. People don't think that corals worry, but over long periods of time they do. They change their structure so that they're inedible. The Pacific corals — if you've been diving in Baja, California — are knobby, and hard to eat. They also have adapted to the crown of thorns starfish. The starfish can't get a good mouthful of a Pacific coral. But there are fragile, brittle forms in the Caribbean that have never thought about, never worried about, a crown of thorns, or about a spotted pufferfish. There's a pufferfish that eats nothing but coral. Giving away Panama might have been the right thing to do politically, but ecologically it could still be disastrous. Somebody could dig that canal; enough money could be raised to do it. I'm worried that the powers that be will not be concerned about biological questions.

DIVERS NEEDED AT CDC

The Commercial Diving Center in Los Angeles Harbor is currently having trouble filling a very critical need for divers. According to Jim Joiner, executive

director of the deep sea diving school, CDC is getting calls from U.S. diving contractors in the Gulf of Mexico requesting newly trained divers to meet the immediate employment demands for off-shore diving needs.

Joiner explained that the need for new divers has been gradually building as the offshore oil industry has gone through the transitional phases from exploration into full production. "During exploration, fewer divers are utilized, in contrast to construction and production phases. And, since the oil crisis and the year-round production in the Gulf of Mexico, new and experienced divers have been in ever-increasing demand. Now, instead of the students visiting diving contractors for job interviews, the firms are calling CDC for their new graduates as soon as they have completed their courses." Divers interested in commercial opportunities may write: Commercial Diving Center, 272 South Fries Ave., Wilmington, CA 90744.

U/W NAVIGATION

"Ssshhh." To a diver lost in muddy water that sound may soon mean safety instead of "be quiet." Dr. James Hicks Jr., a University of Florida scientist, has been using the sound for the past two months to teach divers to navigate underwater by relying on sound instead of sight. With UF's Institute for Advanced Study of the Communication Processes, Hicks found through extensive experiments that a combination of three signals that sound like shh (called white noise) attracts divers from 150 meters away when transmitted underwater through loudspeakers.

"We've found that divers tend to rely on compasses when they are farthest from the sound, but the closer they get, the more they rely on the sound to get them in," said Hicks. "You can localize sounds in water very much like you can in air," Hicks said, "so we were trying to find the best signal. So far, we've found that a complex signal is easier to localize than a pure tone. That's true in air, too."

When perfected, signals could be used on ships, boats and submarines to call in divers working on oil wells or conducting research.

"We've found that hearing the sound underwater improves with practice," Hicks said. "Many of the divers miss the sound (coming from underwater speakers attached under a barge in Lake Magnolia in Camp Blanding near Keystone Heights) the first few times, but found it the last couple of dives. You can train yourself to swim toward it." Sounds, Hicks found, can be more reliable than compasses. "One diver's compass got caught so he was swimming in the wrong direction," he said. "When he started concentrating on the sound, he corrected himself and swam right to the target."

DIVING THE KEYS?

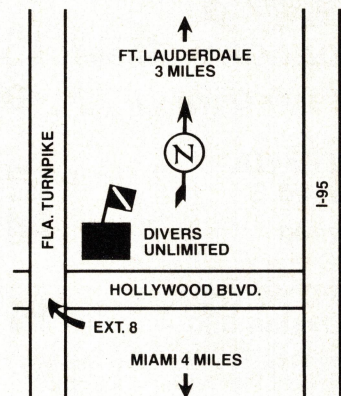


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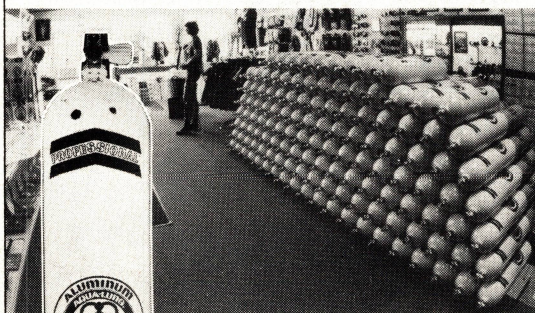
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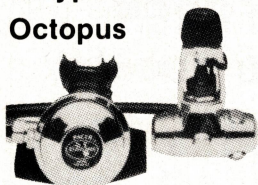
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TECHNIFACTS

(Continued from page 105)

recent years. Mostly this has been in areas where light weight, and not cost, is important, such as in aircraft where a pound of additional weight might cost up to \$300, in fire and police department rescue and breathing units, and, not so strangely, in mountain climbing, where weight is also an important factor.

These cylinders are extremely strong and are, externally, completely impervious to corrosion. The aluminum liners might be susceptible to corrosion under certain conditions, but certainly to no greater extent than currently used aluminum cylinders. Filament wound vessels withstand almost all abuses better than steel and certainly better than the extruded aluminum cylinders now used. Also, they withstand heat better than extruded aluminum cylinders but probably no better than steel. (More on aluminum cylinders in commercial diving in a future Technifacts.)

The primary reason why the dive industry has not converted to filament wound vessels (air tanks) is excessive cost. A spun fiberglass cylinder will cost about twice as much as a steel cylinder of comparable capacity. Secondly, the light weight of the fiberglass cylinder is actually a drawback to the diver who must wear additional weights to overcome the positive buoyancy of the composite cylinders. There are some uses in the dive industry, however — mostly in research diving. Primarily in submersibles where light weight and added positive displacement is an inducement to spend the extra dollars for compressed air storage to be used both for breathing and for blowing ballast in some cases.

Fiberglass piping systems for high pressure water, oil, gas, etc., have been around for some ten or more years. A lot of uses for fiberglass cylinders have already been found and more will be found. But I suspect composite high pressure cylinders will not be available for diving, except for special uses, for some time. This is primarily owing to cost.

AIR STORAGE

A reader wrote stating he has stored his full dive tanks for about nine months. His question is, "Does the air in a dive tank deteriorate or become unusable after a period of time?"

The composition of air in a dive tank could change with time, but only if the tank contained enough moisture for corrosion to take place. The conversion of iron to iron oxide (rust) could use up the oxygen. It would take a lot of corrosion, however. With the cost of air as low as it is, and with the taste of stale air what it is, I would strongly recommend refilling a

dive tank that has been stored for longer than a very few weeks. Particularly if it is not known how much moisture was pumped into the cylinder with the air.

The recommended procedure for storing dive tanks is to slowly let most of the air out of the cylinder, then close the valve and store in a nearly empty condition. If there is moisture in the tank this will limit the amount of internal corrosion, if any, that can take place. Prior to filling for use, let the balance of the air escape slowly and fill the tank to its certified pressure.

DRY SUBMERSIBLES

In the past several months Technifacts has received several requests for companies having either plans for, or completed, small dry submersibles. For those interested, write directly to Kirtledge Industries, Inc., Route 1, Warren, ME 04864. Send \$1.00 for their four page booklet. Or try SCS Industries, 285 NE 185th Street, Miami, FL 33179. Both have indicated they have small, one man submersibles (dry) available. 

TALON KNIFE

(Continued from page 80)

Hold the blade at a 45 degree angle to the stone, then push it across as though cutting a thin slice off the stone. Then reverse the blade to sharpen the other side in the same manner. Continue sharpening, one stroke at a time, alternating sides of the blade. Farallon/Oceanic recommends a 45 degree angle because holding the blade at a shallower angle produces an edge too thin for practical use.

A series of test dives with the Talon bore out the manufacturer's claims. I didn't realize what I'd been missing all these years until I began using it underwater. I could lop off a strand of kelp, or a handful of kelp strands, in one easy slice. Monofilament line parted with a flick of the wrist, with either the blade or the line cutting notch. And, it can still spread peanut butter!

The blade, despite its keen edge, was hefty enough to pry open my waist strap buckle and to crack sea urchins, although I'm sure continued use of it in this manner would have a detrimental effect.

The knife slipped in and out of the scabbard easily. On a couple of occasions I found I hadn't inserted it completely and so it wasn't secure. Be sure to push it in firmly, then give it a slight pull to make sure it's locked in.

The Talon represents a logical step in the evolution of the diver's knife. As diving becomes more sophisticated, so does equipment. The Talon is not for every diver. But, if you appreciate a high quality instrument engineered to perform its task especially well, and are willing to provide the extra care, Farallon/Oceanic's Talon Knife is for you. The Talon retails for \$45 at your local dive shop. 

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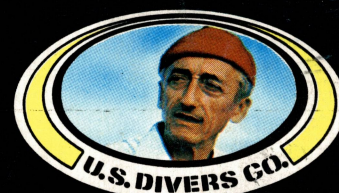
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